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COMMERCIAL FISHERIES ABSTRACTS

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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UNITED STATES DEPARTMENT OF COMMERCE

Maurice H. Stans, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL MARINE FISHERIES SERVICE

Philip M. Roedel, *Director*

FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.33 LIPID-PROTEIN INTERACTIONS IN MITOCHONDRIA.
1. CONDITIONS AFFECTING BINDING OF PHOSPHOLIPIDS TO LIPID-DEPLETED MITOCHONDRIA

Lenaz, Giorgio, Anna Maria Sechi, Giovanni Parenti-Castelli, and Lanfranco Masotti (Istituto di Chimica Biologica, Università di Bologna, Italy)
Archives of Biochemistry and Biophysics 141, No. 1, 79-88 (November 1970)

Little is known concerning the bonds that are responsible for the interaction of lipids and proteins in natural membranes. In this study, the authors present evidence that hydrophobic interactions are involved in the binding of phospholipids to lipid-depleted mitochondrial inner membranes.

The experiments showed that the interaction of mixed micellar phospholipids with lipid-depleted mitochondria is not inhibited by increasing the ionic strength of the medium with NaCl or other salts. The graph describing the effect of increasing ionic strength on binding of phospholipid phosphorus to lipid-depleted mitochondria has a diphasic character. The extent of binding and the rate increase with temperature.

The researchers found that mitochondrial membranes freed on soluble and detachable proteins can be depleted of their lipids and reconstituted by readdition of phospholipid micelles. The reaction is not inhibited by NaCl, but it is inhibited by alcohols and by lyotropic agents inducing disorder in the structure of water. They conclude that the binding of phospholipids to the proteins of the mitochondrial membranes is largely hydrophobic in nature.

[5 figures, 9 tables, 46 references]

0.4 (1.71)(0.39) A FRACTION RESEMBLING OXYTOCIN FROM SQUALUS ACANTHIAS: PHARMACOLOGICAL COMPARISONS WITH SYNTHETIC PEPTIDES

Sawyer, W. H., J. W. M. Baxter, M. Manning, E. Heinicke, and A. M. Perks (Department of Pharmacology, Columbia University College of Physicians and Surgeons, New York, N.Y. 10032; Department of Biochemistry, Montreal, P.Q., Canada; and Department of Zoology, University of British Columbia, Vancouver, B.C., Canada)
General and Comparative Endocrinology 15, No. 1, 52-58 (August 1970)

The active principles from Squalus NIL (the neurointermediate pituitary lobes) can be separated into two fractions. Fraction II, the more basic fraction, contains a small part of the total oxytocic activity of NIL extracts; it also has antidiuretic and frog-bladder hydroosmotic activities. Fraction I, the more nearly neutral fraction, has many properties resembling those of oxytocin; although it behaves as if it contains a single peptide indistinguishable from oxytocin, small but significant differences in its pharmacological properties indicate that it is not oxytocin. In earlier reports, the senior author suggested that the unknown hormone may be an analog of oxytocin in which leucine in the 8-position is replaced by a neutral amino acid. Because the principle is present in very low concentrations, isolation and purification is quite difficult. However, pharmacological studies can be made with relatively small amounts of material, and, although ultimate identification must be made by chemical analysis, pharmacological characterization can be a useful preliminary.

Comparison of the neutral fraction with several 8-substituted analogs of oxytocin (several of which were synthesized as part of this study) indicated that

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0.35 (0.36) INTERACTION OF SPIN-LABELED MYOSIN WITH SUBSTRATE

Stone, Deborah B. (Cardiovascular Research Institute, University of California, San Francisco, Calif. 94122)
Archives of Biochemistry and Biophysics 141, No. 1, 378-380 (November 1970)

Previous workers have shown that the binding of ATP (adenosine triphosphate) to the muscle protein myosin results in a localized conformational change that has been detected by small changes in protein absorption, in the binding capacity for bromothymol blue, and in the transfer of excitation energy from myosin chromophores to a bound fluorescent dye. In the present communication, the author gives corroborative evidence for a substrate-induced conformational change in the myosin molecule using the spin-labeling technique developed by Stone, Buckman, Nordio, and McConnell (1965). [2 figures, 1 table, 14 references]

0.7 FOOD PREFERENCES OF COLLEGE STUDENTS AND NUTRITIONAL IMPLICATIONS

Einstein, Margery A., and Irwin Hornstein (U.S. Department of Agriculture, Agricultural Research Service, Human Nutrition Research Division, Beltsville, Maryland 20705)
Journal of Food Science 35, No. 4, 429-436 (July-August 1970)

In this study the food preferences of about 50,000 college students were analyzed. Two hundred and seven food items were considered in the survey. The objective was to identify nutritionally important food items that are disliked so that eventually their acceptability might be improved by remedying those adverse factors that limit acceptability, or by educating the consumer to accept the foods because of their nutritional value, or both.

The food items were ranked as percentage of the total response for that food in terms of liked, disliked, and do not know. Then, the relation between the food preferences and their nutritional values were examined. The nutritional values considered were vitamin A, vitamin C, calcium, and iron.

If food item preference was the only determinant of food intake, then the dietary intake would be low in vitamin A--the best sources of vitamin A were among the most disliked foods in the survey. The relation between food item preference and possible vitamin C and calcium deficiencies was not apparent. There was little evidence that food preferences (except for liver) discriminated against foods containing important amounts of iron. The scores for food classes and for entrées and vegetable classes were: bread-92, beverages-78, desserts-71, sandwiches-70, appetizers-69, entrées-55 (beef-78, pork-71, chicken-61, veal-51, fish-44, lamb-38,

(over)

0.38 DIGESTIVE ENZYMES OF THE AMERICAN LOBSTER (HOMARUS AMERICANUS)

Brockerhoff, H., R. J. Hoyle, and P. C. Hwang (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 8, 1357-1370 (August 1970)

This paper reports on a study of the digestive enzymes of the American lobster. The gastric juice of the lobster hydrolyzed the following substrates (the enzyme activity is indicated in parenthesis): triolein (lipase); tributyrin (lipase); Azocoll(R)--a collagen coupled with an azo dye (proteinase); p-tosyl-L-arginine methyl ester hydrochloride and benzoyl-L-arginine ethyl ester hydrochloride (chymotrypsin); hippuryl-D,L-phenyl lactic acid (carboxypeptidase; deoxyribonucleic acid (deoxyribonuclease); ribonucleic acid (ribonuclease) p-nitrophenyl-phosphate (phosphatase); p-nitrophenyl-N-acetyl-β-glucosaminide (chitobiase).

The gastric juice showed very low activities against Remazolbrilliant Blue starch (amylase); p-nitrophenyl-α-(and β)-glucopyranoside (α- and β-glucosidase); p-nitrophenyl-β-galactopyranoside (β-galactosidase); and chitin azure (chitinase).

There were no activities corresponding to phospholipase (substrate: lecithin), carboxypeptidase B (benzoylglycyl-L-arginine), elastase, glycylglycine dipeptidase, or leucine aminopeptidase. [6 figures, 4 tables, 27 references] FTP

0.7

liver-23), salads-53, breakfast foods-52, vegetables-51 (potatoes-78, other vegetables-42), and soups-43. Eleven fish entrées were surveyed and the authors stated that only fried shrimp (73% liked) received a rating greater than the median for the entire entrée class (55). [2 figures, 11 tables, 10 references]

0.5 FURTHER STUDIES ON LONG TERM PRESERVATION OF MARINE BACTERIA (7.86)

Greig, Mary A., Margaret S. Hendrie, and J. M. Shewan (Ministry of Technology, Torry Research Station, Aberdeen, Scotland)
Journal of Applied Bacteriology 33, No. 3, 528-532 (September 1970)

In 1958, the authors freeze dried or suspended in glycerol-nutrient broth 44 strains of marine bacteria and 5 strains of nonmarine bacteria. They stored the freeze-dried organisms at room temperature and the others at -29° C. Ten years later they made total viability counts on both groups of organisms. Nine percent of the cultures in the freeze-dried form were not viable; 41% of those in the frozen state were not. Corynebacteria and micrococci had the highest viable counts; vibrios and photobacteria, the lowest. [2 tables, 6 references] LB

0.33 LIPID-PROTEIN INTERACTIONS IN MITOCHONDRIA
II. ON THE NATURE AND BIOCHEMICAL SIGNIFICANCE OF THE INTERACTION BETWEEN PHOSPHOLIPIDS AND LIPID-DEPLETED MITOCHONDRIA

Lenaz, Giorgio, Anna Maria Sechi, Lanfranco Masotti, and Giovanna Parenti-Castelli (Istituto di Chimica Biologica, Università di Bologna, Italy)
Archives of Biochemistry and Biophysics 141, No. 1, 89-97 (November 1970)

In this (part II) study, the researchers examined in detail the interaction of phospholipids with lipid-depleted mitochondria in order to evaluate the hydrophobic character of the binding. The diphasic character of the curve of binding plotted against the concentration of salt apparently is an enhancement of hydrophobic binding by increasing ionic strengths and subsequent impairment of the binding due to the lyotropic effects of high salt concentrations. Also, the amount of phospholipid bound in certain conditions is greater than that in natural levels in mitochondrial membranes, because sites normally buried become exposed for interaction with phospholipid. The workers found that the composition of the bound phospholipids is the same when the interaction is accomplished in the absence or the presence of 1 M NaCl. Succinoxidase activity is restored in lipid-depleted mitochondria by the addition of phospholipid either in salt-free media or at low ionic strengths, but is decreased when the incubation is carried out in 1 M NaCl, in 0.5 M NaSCN, and in 3 M urea.

The authors conclude that the interactions of phospholipids with lipid-depleted mitochondria described appear to be related to the interactions in the native membranes and that the bonds formed between protein and lipids must be primarily hydrophobic, although they do not exclude the possibility of a contribution of polar forces to the binding. [6 figures, 5 tables, 29 references] FTP

0.4
(1.71)(0.39)

it differed from all of them. (The peptides chosen for comparison were selected on the basis of the amino acids known to occur naturally in the 8-position and the mutations that could be considered likely.) Pharmacological criteria indicate that ten 8-substituted oxytocin analogs can be ruled out: oxytocin, isotocine([4-serine, 8-isoleucine]-oxytocin), glumitocin ([4-serine, 8-glutamine]-oxytocin), mesotocin ([8-oxoleucine]-oxytocin), [4-serine]-oxytocin, [8-glutamine] oxytocin, [8-phenylalanine]-oxytocin, [8-valine]-oxytocin, [8-serine]-oxytocin, and [8-alanine]-oxytocin.

The results confirm the fact that elasmobranchs have a variety of active neurohypophysial principles, only one of which (glumitocin) has been positively identified. Arginine vasotocin seems to be present also. But one or more neutral principles have so far escaped identification. Since the physiological functions of the neurohypophysial peptides remain unknown, the authors find it impossible to explain the apparent versatility of these fishes in producing these principles. They only hope that further attempts at isolation and amino-acid analysis of the Squalus fraction will be more successful, offering some specific suggestions about what new synthetic peptides would be worth preparing.

[4 tables, 24 references] LB

0.7 (7.642)(6.193) INVESTIGATION ON NET PROTEIN UTILIZATION COEFFICIENT (NPU) IN RELATION TO THE GROWTH RATE OF EXPERIMENTAL ANIMALS

Rakowska, Maria, Hanna Kunachowicz, and Wieslawa Szkilladziowa (Instytut Zywnosci 8 Zywienia, ul. Powsinska 61/63, Warszawa-34, Poland)
Nutrition and Metabolism 12, No. 3, 160-170 (1970)

According to Platt et al. (1961), NPUop (NPU operative) is a measure of the quality and quantity of protein, whereas NPUst (NPU standard) refers only to protein quality. NPUop was determined by experiments on young rats fed ad libitum a diet resembling that fed to a selected group of human subjects. Platt et al., basing their assumption on work published by Mitchell in 1959 and on that published the same year by the Committee on Amino Acids Requirement of the U.S. National Research Council, assumed that the results obtained on rats are applicable to man. Also, the FAO/WHO Protein Requirement Committee uses an NPUop coefficient obtained with rats to calculate the protein requirements specified for people of different countries.

In 1970, the authors showed that the NPUop for children and for rats was not identical. They postulated that the difference was a result of the higher requirement for protein in rats, caused by the rats' faster growth, than in children. (Using a formula in which the nitrogen needed for growth is divided by the nitrogen needed for endogenous loss, they had derived a growth rate index for children and for rats of 0.1 and 1.7, respectively.) In the present report, they use rats of different ages in an attempt to clarify the influence of growth rate on the value of the NPUst and NPUop coefficients of three protein diets. The diets contained

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0.8 HALON 1301 FIRE-EXTINGUISHING AGENT: PROPERTIES AND APPLICATIONS

Ford, Charles L. (E. I. du Pont de Nemours & Company, Inc., "Freon" Products Division)
Fire Journal 64, No. 6, 36-37, 41 (November 1970) (National Fire Protection Association)

For many fire fighting applications, water sprinklers are impractical (because of lack of water in sufficient quantities) or undesirable (because equipment and materials are easily damaged with water). A new fire-extinguishing agent, bromotrifluoromethane (commercially referred to as Halon 1301) has the advantages of safety to personnel, cleanliness, a high degree of extinguishing effectiveness, electrical nonconductivity, and, upon discharge, production of slight vision obscuration. Bromotrifluoromethane extinguishes fires through a chemical mechanism by breaking the chain of reaction of the combustion process.

Bromotrifluoromethane appears to be ideally suited for use in total flooding systems. As such, it is being used to protect computers, electronic and instrument rooms, chemical laboratories, file rooms, and high-value storage areas.

[1 figure, 2 tables, 8 references]

0.7 (5.2)(0.6) EFFECT OF HEATING METHODS ON THIAMINE RETENTION IN FRESH OR FROZEN PREPARED FOODS

Kahn, Leslie N., and G. E. Livingston (Institute of Human Nutrition, Columbia University, New York, N.Y. 10032)
Journal of Food Science 35, No. 4, 349-351 (July-August 1970)

General acceptance of convenience food service systems will probably await more complete information on the nutritional implications of the systems and the resolution of any problems that might be involved. In this pertinent study the researchers determined the retention of thiamine (vitamin B_1) in four frozen products commonly served in food service operations, in high-speed heating devices, and compared the results with thiamine retention in the same foods freshly prepared and handled by conventional food service methods (that is, held hot on a steam table or in a warming oven until served). The results reported here represent the first study phase of a continuing research program by the Food Science Program of the Institute of Human Nutrition for the purpose of Auditing Convenience Techniques' Impact on Nutrition. The data from these studies should be important to dietitians responsible for maintaining the nutritional adequacy of the diets provided to persons under their jurisdiction.

The researchers found that the losses of thiamine in four common dishes (beef stew, chicken à la king, shrimp newburg, and peas in cream sauce) freshly prepared and held hot at 180° F. (82.2° C.) for 1, 2, or 3 hr. were greater than those losses that occurred when the same foods were prepared, frozen, stored at -10° F. (-23.3° C.), and reheated in a microwave oven or an infrared oven to 194° F. (90° C.). The authors estimated that a difference of as much as 0.26

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0.8 (9.11) ELECTROMAGNETIC INVESTIGATION OF THE SEA FLOOR

Coggon, J. H., and H. F. Morrison (Department of Materials Science and Engineering, University of California, Berkeley 94720)
Geophysics 35, No. 3, 476-489 (June 1970)

Increasing interest and activity in the investigation of marine resources leads naturally to interest in electromagnetic geophysical techniques. In this paper, the authors attempt to analyze fields about a vertical magnetic dipole and, through analysis of the results, to understand field behavior to the end that this behavior can be used for measuring sea-bottom conductivities. Their analysis indicates that a marine electro-magnetic system for measurement of bottom conductivity variations could be readily designed. The system would be applicable for oceanographic and geologic studies and for mineral exploration.

[14 figures, 11 references]

0.7
(5.2)(0.6)

μg. of thiamine per g. of food could occur between fresh food held hot for 3 hr. and the microwave heated-frozen food. And, in an institution where 2 hot meals per day are served (assuming a total intake of 20 oz. of entrees and vegetables per day) the thiamine difference is equivalent to as much as 18.4% of the daily recommended allowance for certain age groups. Data for two of the foods are shown in the following table.

Sample/treatment	Thiamine content (μg/g)		Thiamine retention (%)1/	
	Beef stew	Shrimp newburg	Beef stew	Shrimp newburg
Laboratory samples				
Freshly prepared	0.98	0.93	100	100
After - 10° F. storage	0.94	0.89	96	96
Frozen/microwave heated	0.93	0.86	95	92.5
Frozen/infrared heated	0.89	0.82	91	88
Frozen/immersion heated	0.83	0.80	85	86
Fresh/held at 180° F. 1 hr.	0.72	0.71	73.5	76
Fresh/held at 180° F. 2 hr.	0.67	0.68	68	73
Fresh/held at 180° F. 3 hr.	0.62	0.61	63	66
Commercial samples				
Frozen	0.93	0.88	100	100
Frozen/microwave heated	0.87	0.80	94	91
Frozen/infrared heated	0.83	0.76	89	86.5

1/Percent retention of thiamine is in relation to the freshly prepared products, except for the commercial samples, where percent retention is in relation to the frozen products.

[1 figure, 2 tables, 7 references]

0.8 APPLIED MARGINAL ANALYSIS IN FOOD ENGINEERING SYSTEMS
(0.6)

Ryan, Joseph P. (Arthur G. McKee & Co., 10 S. Riverside Plaza, Chicago, Illinois 60606)
Food Technology 24, No. 12, 31-35 (December 1970)

The author believes that the food engineer's greatest challenge in the 1970's is to develop food process systems that blend engineering, food science, and economics in complete harmony so as to achieve the greatest level of optimization in the utilization of resources. This paper discusses an analytical technique in planning the optimum design of food engineering systems based on marginal analysis Marginal analysis approaches the resolution of complex food-processing problems of choice by methodically examining the costs, benefits, risks, and timing of alternative courses of action. [5 figures, 3 tables] FTP

0.6 MEAT PROTEIN EXTRACTION

U.S. Patent 3,523,800
Trautman, J. C.; Oscar Mayer & Co. (pat.)
Food Technology 24, No. 12, 56, 58 (December 1970)

The binding and emulsifying properties of meats are improved by extracting them with salt solution (to remove the actomyosin). FTP

0.7
(7.642)(6.193)

4, 10, or 20% of protein each, in the form of egg-albumen (chemical score 100% of FAO 1957 amino-acid pattern), casein (chemical score 60%, with methionine limiting), and gluten-albumen (chemical score 69%, with lysine limiting). The rats were 25, 45, 70, or 135 days old.

NPUst, NPUop, and Nu/Nc (nitrogen urea/nitrogen creatinine) coefficients were determined. For all three proteins, the NPUop coefficient was affected by the growth rate of the animals, as was the Nu/Nc ratio. The decrease of the NPUop in each succeeding period of the rats' life was proportional to the decrease in protein synthesis for growing tissues. In contrast, the NPUst changed little from period to period, the value being closely correlated with the chemical score of the protein.

The authors conclude that the difference in growth rate of rats and humans might lead to erroneous data if protein in human diets is evaluated by means of the NPUop coefficient. They add: "it is not possible to have an answer for two objectives from one experiment in the assessment of protein quality by means of NPUst and NPUop. The first is to classify or to screen proteins according to their nutritive value and the second is to apply the information to human diets There is no need to look for a new method, but by means of a good method, which is the Miller, Bender [1955] NPU procedure, it should be chosen the standardized protein level for both purposes. It seems that the proper level lies near to 4 NDp Cals %. That the level of dietary protein used in experiments with rats gives the best correlation with amino-acid score and is practically most useful also for food of lower protein content." [sic] [4 figures, 4 tables, 12 references]

0.8 BOTTOMLESS HARBOURS
(2.2)

Garrett, C. J. R. (Institute of Geophysics and Planetary Physics, University of California, La Jolla)
Journal of Fluid Mechanics 43, Part 3, 433-449 (September 16, 1970)

Surface gravity waves are incident [illustrated] on a hollow cylinder that is partially immersed in water of finite depth--for example, a circular dock or an artificial island with a bottom. The author considers, mathematically, the resulting wave motion inside the cylinder, suggesting that the results of his evaluation could be useful to people trying to decide whether artificial islands (such as the one proposed by the Scripps Institution of Oceanography) need bottoms to their harbors. Although a harbor without a bottom is cheaper to build than one with a bottom, the bottom can be omitted only if the harbor is calm enough to permit it.

The results of the evaluation may also be useful in helping decide whether it is feasible to protect a small area of sea from swells by building a deep wall around the area, thereby ensuring that work being done inside the area can be undertaken in calm water. [5 figures, 1 table, 9 references] LB

2.06 RESEARCH ON PROCESS FOR MAKING SHARK MEAT EDIBLE
(0.6)(2.3)
(1.7)

Tishin, V. E. (U.S.S.R.)
Chemical Abstracts 73, No. 13 65101k (September 28, 1970)

1.84 (9.12)(9.16) REPRODUCTION AND BREEDING CYCLE OF THE GIANT SCALLOP PLACOPECTEN MAGELLANICUS (GMELIN) IN PORT AU PORT BAY, NEWFOUNDLAND

Naidu, K. S. (Memorial University of Newfoundland, St. John's)
Canadian Journal of Zoology 48, No. 5, 1003-1012 (September 1970)

The cyclic changes in the gonad of the giant scallop are reported. These changes, which are related to the reproductive cycle, and the histological changes that accompany the breeding cycle are discussed. A few of the scallops not only spawned in June but also participated in the major spawning that occurs in September and October. A relation between wave action, onshore winds, and the onset of spawning is indicated; spawning may, therefore, be initiated by prolonged exposure of the scallop to physical shock. Salinity and tidal amplitude, which vary little in the Bay, apparently are of little importance in the scallops' reproductive activity; moonlight rhythm may, however, be an influence on these shallow-water animals. [22 figures, 3 tables, 30 references]

 LB

1.85 (1.013) SEA BOB FISHERY OF THE GUIANAS

Rathjen, Warren F., and B. C. C. Hsu (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Woods Hole, Massachusetts 01930)
Commercial Fisheries Review 32, No. 10, 38-44 (October 1970)

Evidence of new shrimp sources being tapped are illustrated graphically by the increases during recent years in shrimp harvesting in Northeast Pacific and Northwest Atlantic. The catch of small shrimp in Alaska has tripled since 1965 Off New England, the shrimp catch has doubled each year for the past 4 years. There is some reason to speculate that the production of shrimp from existing sources may be reaching its upper limit.

There are some unconventional supplies that never have been fished heavily in some parts of their range. These include certain shrimp inhabiting great depths of the ocean basins and, somewhat surprisingly, at least one species found near shore along much of the tropical and semitropical shoreline of the western Atlantic. A species in the latter category is the sea bob, Xiphopeneus kroyeri, found in the Atlantic from southern Brazil to Cape Hatteras, North Carolina.

The "Guianas"..., including Guyana (formerly British Guiana), Surinam (Dutch Guiana), and French Guiana all have fisheries for sea bobs.

No reliable estimates are available that project possible landings from this fishery. About three million pounds are taken by stationary gear at less than half the available fishing sites. Fishing is conducted within a very limited part of the sea bob's range. These factors suggest that an increase by a factor of ten times or more might be anticipated by pursuing more aggressive fishing techniques (trawls). [10 figures, 7 references]

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1.87 (1.0119) (1.013) PESQUERIAS DE LA LANGOSTA PANULIRUS ARGUS (LATREILLE) EN EL BRASIL Y EN CUBA [FISHERIES FOR SPINY LOBSTER PANULIRUS ARGUS (LATREILLE) IN BRAZIL AND IN CUBA]

Buesa Más, René J. (Centro de Investigaciones Pesqueras, Playa Habana, Bauta, Cuba), and Melquíades Pinto Paiva (Laboratório de Ciências do Mar, Universidade Federal do Ceará, Fortaleza, Ceará, Brasil)
Arquivos de Ciências do Mar 9, No. 1, 77-81 (June 1969) (Fortaleza, Ceará, Brazil) (In Spanish; English summary)

According to available information, Brazil and Cuba have captured 74.8 per cent of the 92.0 thousand tons of spiny lobster Panulirus argus (Latreille), caught in the span of its geographical area, from 1961 to 1966. These two countries are the world major producers of this spiny lobster.

The present paper compares the fishery for the mentioned spiny lobster in both countries, and the following conclusions are drawn:

1--According to the average of capture in Brazil and Cuba (1:2.5) and fishing area surface (2:1), it is possible to conclude that the exploitation levels of Cuba are five times superior than those of Brazil, being conditioned by the fishing effort and abundance.

2--It is possible to assume that the spiny lobster population in Brazil is a single, uniform one, able to interbreed by means of migrations, due to the geographical continuity of the continental shelf.

3--The great depths and discontinuity in the plataforms that comprise the four spiny lobster fishing areas in Cuba, prevent the interbreed by migrations, reason why, four different populations, from the fishery point of view, must be considered. [2 figures, 4 tables, 3 references]

 Authors' summary

2.01 (0.32) EFFECT OF MICROBIAL GROWTH UPON MYOFIBRILLAR PROTEINS

Rampton, J. H., A. M. Pearson, J. F. Price, T. Hasegawa, and R. V. Lechowich (Department of Food Science, Michigan State University, East Lansing, Michigan 48823)
Journal of Food Science 35, No. 4, 510-513 (July-August 1970)

This paper reports on a study of the action of microbial growth upon the myofibrillar proteins during spoilage of meat. Aseptic samples of muscles from the pig and rabbit were inoculated with Achromobacter liquefaciens, Micrococcus luteus, Pediococcus cerevisiae, Pseudomonas fluorescens, Streptococcus faecalis, and a mixed culture obtained from a sample of commercially prepared hamburger.

The uninoculated control and the inoculated samples were incubated at 3° and 10° C. for 0, 8, and 20 days. The salt soluble proteins were extracted with Weber-Edsall solution and then subjected to sucrose density gradient centrifugation, gel filtration, and disc gel electrophoresis. Good growth was achieved only with the A. liquefaciens and the mixed flora from the hamburger.

The microorganisms had no measurable effect upon the myofibrillar proteins of the muscles of the rabbit or pig. Bacterial growth did, however, decrease the amount of certain nonprotein ultraviolet light absorbing components in the ultracentrifugal pattern of Weber-Edsall extract; the components apparently were not of myofibrillar origin. [6 figures, 1 table, 10 references]

 FTP

1.85 NORTHERN SHRIMP: ITS FRESH & FROZEN LIFE
(2.15)(3.234) WHEN COOKED AT DIFFERENT STAGES OF FRESHNESS

Tinker, Burton L., and J. Perry Lane (Bureau of Commercial Fisheries Technological Laboratory, Emerson Avenue, Gloucester, Massachusetts 01930)
Commercial Fisheries Review 32, No. 10, 17 (October 1970)

Norwegian and Swedish scientists have reported that the quality and yield of northern shrimp, Pandalus borealis, can be enhanced by cooking the catch soon after harvesting. BCF's Gloucester Technological Laboratory sought to determine the extent of the advantage of cooking shrimp within 2 hours after catching over shrimp cooked 24 hours after catching--and over shrimp not cooked at all. We also investigated the freezing of shrimp at sea.

This study was concerned with raw frozen shrimp and with frozen shrimp because New England northern shrimp are marketed in both forms.

The results of this study showed that cooking at sea improves the texture and enhances the flavor of northern shrimp. More important, the quality of shrimp cooked at sea less than 8 hours after landing was better than the quality of shrimp held for more than 8 hours before cooking. The texture of the shrimp cooked at sea was firmer, and the shelf life was longer than that of shrimp cooked ashore 24 hours after being caught.

Shrimp cooked at sea and stored at 33° F. rated an average score of 6.6 (fair to good), and they had an average acceptable shelf life of about 3 weeks. This compared with a shelf life of 1 week for shrimp cooked ashore. The shrimp cooked and frozen at sea had an average quality rating of 7.0 (good), compared with 6.3 (fair to good) for shrimp frozen in raw state. The samples cooked and frozen at the laboratory were of low quality throughout the test (5 months).

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1.80 PAPERS ON THE RARE AND ENDANGERED MOLLUSKS OF NORTH AMERICA
(9.17)(9.16)

Clarke, Arthur H. (ed.)
Malacologia 10, No. 1, 1-56 (May 1970)

On July 16, 1968, the American Malacological Union held its 34th annual meeting in Corpus Christi, Texas. Papers were read by 14 malacologists; all those that have been released for publication are reprinted here. They constitute the first attempt to enumerate the rare and endangered species of any continental molluscan fauna. The hope was that they might provide some basis for planned conservation or, if necessary, for propagation of these species. The following papers and the ensuing discussions are contained in this collection:

"Eastern Freshwater Mollusks (I). The Mississippi and St. Lawrence River Systems," by David H. Stansbery (Faculty of Population and Environmental Biology, Ohio State University, Columbus 43210) [12 figures, 21 references]

"Eastern Freshwater Mollusks (II). The South Atlantic and Gulf Drainages," by William H. Heard (Florida State University, Tallahassee 32306) [8 references]

"Western Freshwater Mollusks," by Dwight W. Taylor (Arizona State University, Tempe 85281) [The full text of this paper is not given.]

"Eastern Marine Mollusks," by R. Tucker Abbott (Delaware Museum of Natural History, Greenville 19807)

"Western Marine Mollusks," by A. Myra Keen (Department of Geology, Stanford University, Stanford, California 94305) [5 references]

"Brackish Water Mollusks," by J. P. E. Morrison (Division of Mollusks, U.S. National Museum, Washington, D.C. 20560).

Two papers on land snails are also contained. LB

2.06 MARSH CLAMS ARE UNEXPLOITED RESOURCE, SAYS VIMS
(1.82)

Anonymous
Commercial Fisheries Review 32, No. 10, 11 (October 1970)

Vast beds of marsh clams are awaiting use by man, scientists of the Virginia Institute of Marine Science, Gloucester Point, reported in September. They were attending Regional Seafood Seminar at Virginia Beach. Dexter Haven discussed the distribution and abundance of Rangia, the marsh clam, in Virginia waters. Dr. Marvin Wass described its general biology.

"The marsh clam is the same family with the well-known surf clam and the little Mulinia, probably the most abundant clam in Chesapeake Bay. Both are used by wild ducks for food." [From Dr. Wass' report]

Haven reported: "On July 16, 1970, we took our hydraulic dredge to the vicinity of Hog Island on the James River near the Surry Power Plant intake for cooling water. Clams were lifted by the dredge at the rate of 1-2 bushels per minute. These clams shucked out about 8 pints per bushel. However, yields at other seasons might be lower." He estimated that in this stretch of river over a ton of meats could be recovered in a day.

In sections of James and Rappahannock rivers, marsh clams are so abundant they make up probably 98% of the weight of everything living in the bottom, the VIMS scientists claim.

Haven stated: "This is an enormous mass of usable food. Rangia might possibly be eaten by humans cooked in chowders, steamed or cooked in other ways. They also could be manufactured into poultry feed and cat and dog food."

When used for human consumption, Rangia should be harvested and handled under health laws regulating oyster and clam use. It is not safe to eat those taken from polluted waters, the scientists warn. Reprinted in part

1.9 THE RED GROUPER OF THE GULF OF MEXICO
(9.12)

Rivas, Luis R. (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, Pascagoula, Mississippi 39567)
Commercial Fisheries Review 32, No. 10, 24-30 (October 1970)

The red grouper (Epinephelus morio) is probably the most abundant and commercially important grouper in the Gulf of Mexico, according to Jarvis (1935:3) and Moe (1969: 2). This is supported by records of the BCF Exploratory Data Center, Pascagoula, Miss., during 1950-1970.

Little is known of the biology, distribution, ecology, and other aspects of its life history. In 1969, Moe dealt mostly with age, growth, and reproduction of red grouper from a small area off the central Florida Gulf coast. Some needed information is presented in this article. [6 figures, 15 references]

Partial reprint

1.951 THE HARP SEAL, PAGOPHILUS GROENLANDICUS (ERXLEBEN, 1777).
(9.14) I. METHODS OF HANDLING, MOLT, AND DISEASES IN CAPTIVITY

Ronald, K., E. Johnson, M. Foster, and D. Vander Pol (Department of Zoology, University of Guelph, Guelph, Ontario)
Canadian Journal of Zoology 48, No. 5, 1035-1040 (September 1970)

Harp seals will eat up to 10% of their body weight per day. They should be fed only fish of a quality equivalent to that for human consumption. If the fish contains thiaminase, thiamine at a rate of not less than 5 mg./kg. total weight must be administered. Vitamin supplements are essential. The seals should never have to live in water warmer than 15° C. Adequate swimming space is necessary--the optimum is 30,000 l. of water per animal; the absolute minimum 10,000 l.

[6 figures, 3 tables, 10 references] LB

2.06 THE OCEAN QUAHOG--A BOUNTIFUL CLAM
(3.20)(3.30)(1.82)

Mendelsohn, J. M., P. S. Parker, E. D. McRae, Jr., F. J. King, and A. H. Joyce
(Bureau of Commercial Fisheries, Gloucester, Massachusetts)
Food Product Development 4, No. 7, 90, 92, 97 (November 1970)

To encourage the commercial utilization of the ocean quahog (Arctica islandica), the authors reviewed completed research and development work on the species. The ocean quahog occurs in the Northeast Atlantic in depths from 6 to 90 fathoms. The authors estimate that the ocean quahog stocks off the United States in the Northeast Atlantic could support a sustained annual production of 150,000,000 pounds of ocean quahog meats. Present harvest is only 500,000 pounds of meat per year. Certain technological problems limit the acceptance and use of ocean quahogs. The meats sometimes have a strong "medicinal" odor and flavor that increases with storage of the product. The color of the meats varies from light brown to almost black. The shells are extremely hard and are tightly closed so that the quahogs are difficult to shuck (that is, to open the shell to remove the meats). When the quahogs are opened by steaming, the meats develop a tough and rubbery texture, become dark in color, and have an unpleasant flavor and odor.

The authors, however, believe that most of these problems can be resolved. Transplanting the quahogs from one bed to another may help eliminate the flavor problem, or they could be held in filtered sea-water tanks prior to shucking. Preliminary tests indicate that opening of the quahogs with microwave energy may be feasible. Finally, development of appropriate new products and recipes that

(over)

2.110 ADVICE TO U.S. SHIPYARDS

Anonymous
Fishing News International 9, No. 9, 11 (September 1970)

This editorial points out how shrimp-boat yards, through series building and other economies, have shown that adequate vessels can be built in local yards at a price that fishermen can afford. But, in other sections of the United States fishing capability is reduced because many of the vessels are obsolete, fishermen lack capital to replace the boats, and domestically built boats are relatively costly.

Reference is made to a recent study ("The Conversion of Shipbuilding From Military to Civilian Markets," by Daniel M. Mack-Forlist and Arthur Newman, Praeger Publishers, Price £6 5s.) that points out that a large part of the domestic shipbuilding industry was kept alive through orders for naval vessels. Now, many shipyards must find an alternative civilian market in order to survive. The authors of the book suggest changes in shipyard financing, equipment, and methods. Further, they suggest that the United States government might encourage a program for replacement of one-third of the some 3,000 vessels over 25 years old. The authors contend that U.S. shipyards, properly organized, could build at competitive prices with foreign yards if they had a substantial building program for standard-type vessels. Eventually, they foresee under these conditions cost reductions of 20 to 30% over present prices.

2.115 REDUCING HAZARDS ON DECK
(2.119)

Breakwell, Roger K.
World Fishing 19, No. 8, 10 (August 1970)

The project reported here was submitted in partial fulfillment of requirements for a graduate degree at the Royal College of Art in London. Research for the project was done with the help of Leslie Baines, a fellow student; several members of the Holland-Martin Committee; the British White Fish Authority; the Transport and General Workers' Union; and the skipper of a commercial trawler. Although data on the causes and effects of accidents were difficult to obtain, those that were available made clear that the most dangerous working space on a trawler is on deck--and a great number of the acidents there happen around the winch whipping drum and its associated lifting gear. Therefore, the author set as a goal replacement of the whipping drum system with an economic number of independent winches having prewound drums of cable.

Consideration of each of the major hazard sources--the warps, work during manipulation of the boards, the hauling operation--led the author to devise an integrated net-handling system that includes a net drum driven from the main winch motors and having smaller-diameter side sections than usual to accommodate the bobbins. The hydraulic winches are set further aft than is normal, with the lower sections below deck height. The warps lie below deck in troughs that are covered by heavy-gauge steel guards; mechanical measurement of warp length and tension is controlled from the winches themselves. Visual monitoring of the warps is made

(over)

2.141 REMOTE FISH SENSING SYSTEM SPOTS SCHOOLS FROM MILE UP

Anonymous
Fishing Gazette 87, No. 9, 36, 38 (September 1970)

The Exploratory Fishing and Gear Research Base [a component of the National Marine Fisheries Service] at Pascagoula, Mississippi, in cooperation with the National Aeronautics and Space Administration, is testing a remote sensing system that can spot schools of fish at night from a mile in the air. The system was originally developed by the Army to spot troop movements in Vietnam. Now that it has been declassified, it has become part of the Spacecraft Oceanography Project to locate and identify fish schools and relay the information to commercial fishing interests.

Called an Image Intensifier, the system works on the principle that radiation, like sound, is emitted at wave lengths imperceptible by human beings. The intensifier, which transmits no light of its own, collects this radiation from what to the human eye would be solid darkness, amplifies it over 45,000-fold, and converts it to visible light. Even on moonless or cloudy nights the intensifier can furnish relatively sharp images of boats and buoys at considerable distances. But its real value lies in its ability to detect the bioluminescence associated with moving schools of fish. This glow is generated by dinoflagellates, which emit light when excited or agitated by schooling fish. Fortunately, this light is in that part of the visible spectrum where transmission in sea water is at a maximum--and the intensifier is extremely sensitive to near infrared and visible light. Moreover, the greatest concentrations of these luminescing organisms seem to be in

(over)

2.113 (6.31) COPPER TOLERANCE IN THE MARINE FOULING ALGA ECTOCARPUS SILICULOSUS

Russell, G., and O. P. Morris (Department of Botany, University of Liverpool, England)
Nature 228, No. 5268, 288-289 (October 17, 1970)

As early as 1963 the senior author demonstrated that the response of marine algae to habitat could vary intraspecifically. During an investigation of the ship-fouling properties of the brown alga Ectocarpus siliculosus (Dillw.) Lyngb., he and his coworker noted a differential response to dissolved copper that they associated with the habitats from which the alga came.

The algae studied were taken from an open, uncontaminated, rocky shore at Rhosneigr, Anglesey, and from the hulls of two ocean-going freighters that had been treated with copper-based antifouling preparations. Known volumes of the plant material were used as inoculum in successive media containing different concentrations of dissolved copper. The cultures were grown for 5 weeks under continuous fluorescent white light of 2,700 lux at between 10° and 15° C., and the increase or decrease in plant volume was determined weekly. Results showed that the ship-borne algae are more tolerant to dissolved copper by a factor of 10. In point of fact, both ship-borne populations grew faster in low copper concentrations than under control conditions. Since copper has long been used as a base for antifouling treatments, the authors conclude that the ship-borne algae had become tolerant to the metal, much as some insects do to DDT. They point out that these results may explain the incomplete success of antifouling preparations and the difficulty of developing an infallible antifouling product for use on ships' hulls. [1 figure, 7 references] LB

2.141

areas where commercial fishing is most productive. In addition, certain species of fish school more actively near the surface at night.

In tests to determine if the fishing industry could make round-the-clock catches as a result of information relayed by the intensifier, the researchers took reels of video tape from positions ranging in height from 500 to 5,000 ft. The tapes showed schools of thread herring off the Florida coast as pulsing, flowing balls of light; individual fish showed up as delicate shafts of luminescence. These results have led the researchers to believe that the system, with refinements, could permit rapid surveys of large areas of the ocean, reducing search time and dramatically increasing catches and profits. On the basis of an economic study of the California-based tuna fleet, an increase in catch rate of 25% a day (less than one set) would increase the net profit of each of the larger vessels in the fleet by from $93,000 to $152,000. Reducing search time by 50% and increasing catch rate by 25% would save this one fleet about $12,000,000 a year. [4 figures]

2.3 (3.331) TUNA PROCESSING

Canadian Patent 847,280
Swartz, W. E.; Calgon Corp. (pat.)
Food Technology 24, No. 12, 58 (December 1970)

Raw tuna is treated with sodium tripolyphosphate (prior to cooking) to increase the yield of white meat and to improve the flavor. FTP

2.06

considered the characteristics of the species would encourage greater acceptance of the food. Results of laboratory tests showed high acceptance for the following products made from ocean quahogs: fried (quahog) cakes, stuffing, deviled clams (quahogs), and chowder. Suggested basic recipes are given for quahog patty and puffs, stuffed quahogs, poultry stuffing, quahog sausage, and quahog roll. [1 illustration, 1 table, 10 references]

2.06 SHRIMP RICE CRACKERS

Japanese Patent 14107/70
Gomeikaisha Kiku Shoten (pat.)
Food Technology 24, No. 11, 66 (November 1970)

The patent covers a process for the preparation of shrimp-rice cracker dough for oven baking. FTP

2.06 WHITEBAIT FISH PRODUCT

Japanese Patent 14868/70
Konaka, T. (pat.)
Food Technology 24, No. 11, 66 (November 1970)

Frozen whitebait are bleached, dehydrated, and fermented in a mixture containing sake lees (for flavoring). FTP

2.115

easy by the expanded steel covers that entirely shroud the winch barrels, the ratchet gear, and the warp troughs. Aft, the warps rise in an arrangement similar to that for sheaves on a side-trawler. Platework entirely isolates them from normal crew contact. On the starboard side, this platework serves as a pedestal for central control, who has visual contact with all the working components of the system; on the port side, it forms a series of false-bottomed storage containers.

At the stern, the gantry is lower and of lighter construction than normal, for it does not have to bear the weight of the loaded warps--its function is to arrest the boards and support the outhaul gantry and winch. The boards are stowed in the bows and locked when up, enabling the man working them to do so in isolation from them and their associated dangers. The rear gantry houses a pair of winches for lifting the cod end above the fish-chute hatch; these winches are shrouded to above head height and controlled from a central point. The mate or boatswain who is positioned at central control has charge of all gear except the main winches, which are the responsibility of the skipper. He and the skipper are in audio and visual contact at all times.

The overall advantages of the system lie in the economy it provides in space and crew. The control task has been so simplified that one man can do the work that three did previously. The physical effort required of the crew has been substantially reduced. Nets and gear can be worked on a much shorter deck than before, so economy of effort and material results. The author suggests that this last advantage could lead to a radical reappraisal of trawler-deck design. [1 figure]

2.1477 (1.125) JAPANESE ROBOT POLE FOR TUNA FISHING

Anonymous
Fishing News International 9, No. 10, 73, 74 (October 1970)

A Japanese firm has developed an automatic machine for angling for skipjack tuna (called the 'robot machine'). It is installed on the bulwark of the vessel and consists of a pole and line attached to a cylinder within the cabinet of the apparatus.

The cylinder (which controls the fishing pole) is driven by hydraulic pressure. When the fish bites, a switch that activates the machine is triggered. The machine, then, raises the pole to a position over the deck where the fish is automatically dropped from the line. After the fish is released, the switching system reverses the direction of movement of the drive cylinder and the pole and line are returned to the fishing position.

The machine was tested with success aboard a commercial tuna (skipjack) fishing vessel. [1 figure, 1 illustration]

 FTP

3.12 (3.11) TOXICOLOGICAL EVALUATION OF SOME COMBINATIONS OF FOOD PRESERVATIVES

Shtenberg, A. J., and A. D. Ignat'ev (Institute of Nutrition, Academy of Medical Science of the U.S.S.R., Ustinski proesd 2/14, Moscow G-240, U.S.S.R.)
Food and Cosmetics Toxicology 8, No. 4, 369-380 (August 1970)

Although newer techniques for extending the shelf life and conserving the nutritional value of foods have been developed, chemical preservatives still have an economic importance. Sulfites and benzoates were once used widely in the U.S.S.R. as food preservatives, but their use is now restricted as much as possible. For example, benzoic acid is still used for preserving salmon caviar and spiced sprats, among other products, and sodium benzoate is permitted in margarine and fish preserves. When sorbic acid and nisin (an antibiotic) were proposed for use as preservatives, the All Union Institute of the Food Canning Industry undertook to study the technological and economic aspects of these compounds as food additives while the authors studied the toxicological aspects. Since mixtures of food additives are ingested by way of the normal diet, they conducted short- and long-term (3 months and 17 or 18 months) oral toxicity tests on rats and mice by administering combinations of benzoic acid and sodium bisulfite (40/80 or 80/160 mg./kg.) and of sorbic acid and nisin (40/2 or 80/4 mg./kg.). And, although toxicological data are available on the effect of these individual compounds on experimental animals, they also conducted short-and long-term tests using each compound. They administered daily doses of nisin, sorbic acid, benzoic acid, and sodium bisulfite at rates of 2 or 4, 40 or 80, 40 or 80, and 80 or

(over)

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2.15 (1.85)(2.8) USE OF ANTIFOAMING AGENTS IN SHRIMP COOKING

Leyczek, John C., Jr. (Bureau of Commercial Fisheries Technological Laboratory, Emerson Avenue, Gloucester, Massachusetts 01930)
Commercial Fisheries Review 32, No. 10, 18 (October 1970)

When shrimp is cooked in brine, one problem noted by some processors is the formation of an excess amount of foam. This is particularly noticeable in cooking at sea.

Recently, several silicone antifoam emulsions have been evaluated for use as defoamers in shrimp cookers. The antifoamants were FG-10 from Dow Chemical, and AF-72 silicone antifoam from General Electric. Both antifoamants are approved by the U.S. Food and Drug Administration for use as direct food additives in concentrations described in their literature. The permissible concentrations vary according to the individual foam, and the user should observe these.

[Test] Results showed that both emulsions were successful in retarding formation of foam ordinarily produced when shrimp is cooked.

 Reprinted in part

3.12 PHOSPHATE TREATMENT OF FROZEN PRAWNS. II. FROZEN STORAGE CHARACTERISTICS OF PRAWN MEAT TREATED WITH POLYPHOSPHATES

Mathen, Cyriac (Central Institute of Fisheries Technology, Ernakulam, Cochin 11, India)
Fishery Technology 7, No. 1, 52-57 (1970) (India)

This paper reports on a study of the frozen storage (at -23° C.) life of prawns treated with alkaline and neutral solutions of sodium tripolyphosphate. Individual lots of peeled and deveined prawns (P. stylifera) were frozen and stored after dipping in the following:

1. Water.
2. Sodium tripolyphosphate solution (12%).
3. Sodium tripolyphosphate (12%) and sodium dihydrogen phosphate (8.6%) solution.
4. Sodium tripolyphosphate (12%) and citric acid (2%) solution.
5. "Freeze Gard" (8%)(A patented commercial product.).

Storage time was 7 months. The samples were periodically examined (organoleptically and chemically) during the storage period.

Treatment of peeled and deveined prawns with neutral solutions of tripolyphosphate improves their initial yield on thawing and on cooking and, further, helps to retain these improved yields during their frozen storage. Furthermore, such treatment protects the prawns from denaturation of their protein (as measured by the solubility of the protein in 5% NaCl) during storage.

[12 figures, 15 references]

 FTP

2.3 (1.86) GETTING MEAT FROM UNCOOPERATIVE CRABS

Anonymous
Commercial Fisheries Review 32, No. 10, 19 (October 1970)

Because picking meat from crab by hand is tiresome--and because the meat adheres tenaciously to the shell--the search for a mechanical process to separate meat from shell has challenged ingenuity of industrial scientists.

One was Dr. Wayne Tretsven, BCF Technology Laboratory, Seattle.

Dr. Tretsven visualized a combined manual and machine process in which the prime-value, easy-to-separate meat is recovered by hand, and the lesser-value, hard-to separate meat is recovered by machine. In the machine recovery, he pictured a centrifugal method in which the shell portions, after having been chopped into 3/4-inch lengths, are separated from the meat by the difference in density of the meat and shell in brine.

Even at present stage of development, the process is impressive: it increases yield of crab meat by 50%. This improved yield results from virtually complete separation of meat from shell, and less loss of soluble protein and flavor components from meat.

Dr. Tretsven has tried his process with three species of crab: Dungeness, blue, and tanner (also called snow crab). The yields he obtained from Dungeness crab waste after crab had been picked was 14 to 20%; from cooked blue-crab claws 31%; from cooked tanner-crab bodies 52%; and from cooked tanner-crab legs 29%.

Reprinted in part

3.15 (3.2343)(3.12) CHEMICAL AND PHYSICAL CHANGES IN IRRADIATED AND FROZEN BOMBAY DUCK

Kumta, U. S., and M. S. Gore (Biochemistry & Food Technology Division, Bhabha Atomic Research Centre, Trombay, Bombay 85, India)
Journal of Food Science 35, No. 4, 456-460 (July-August 1970)

The fish Bombay Duck (Harpodon nehereus) is readily susceptible to drip losses and adverse texture changes when frozen or irradiated and stored. This paper reports on the effect of dip (sodium chloride or sodium tripolyphosphate solutions) treatments on the subsequent chemical and physical changes that take place in the fish flesh after freezing or irradiation and storage.

The fish stored at 0° or -20° C. showed loss of extractable protein (using 5% salt solution) along with increased amount of drip; but those losses appeared to be arrested by use of a dip treatment (15 min.) in 10% solution of sodium tripolyphosphate. The fish irradiated at a dose of 3 Mrad showed increased drip loss and concomitant increased loss in protein extractability, but when the fish were given a dose of 0.5 Mrad the increased drip losses occurred without appreciable decrease in extractability of the protein. The authors attribute the loss of extractability of protein to the aggregation of fibrillar proteins induced by irradiation. Furthermore, they suggest that the off-odors induced by irradiation treatment originates from the sarcoplasmic proteins of the fish.

[3 figures, 5 tables, 26 references] FTP

2.1128 FISH BEHAVIOR STUDIES FROM AN UNDERSEA HABITAT

High, William L., and Alan J. Beardsley (Bureau of Commercial Fisheries Exploratory Fishing and Gear Research Base, 2725 Montlake Blvd. East, Seattle, Washington 98102)
Commercial Fisheries Review 32, No. 10, 31-37 (October 1970)

Saturation diving from an undersea habitat permits scientists to make direct observations and to maximize their effective underwater time. During Mission I of Tektite II in the U.S. Virgin Islands, the authors conducted studies of fish behavior in and near pots (traps).

Three pot designs were studied: (1) the typical Virgin Island pot of chicken wire and wood strips, (2) an experimental collapsible pot utilizing nylon web and an aluminum frame, and (3) a commercially manufactured plastic pot.

The Virgin Island pot captured the greatest number of fish, although they were smaller than those captured in the experimental pot. The plastic pot caught few fish. Numerous behavioral characteristics relating to fishes within the influence of the pots were noted, including territorial defense, social behavior, and predator-prey relationships. Bait seemed to play a minor role in attracting fish to the pots. [7 figures, 2 references] Authors' abstract

3.12

160 mg./kg., respectively. In addition, they administered 0.4 to 400 mg./kg./day of nisin, 40 mg./kg./ day of sorbic acid, and a polymeric impurity derived from the sorbic acid to the mice for 2 months.

The doses used (roughly equivalent to the maximum levels at which the preservatives may occur in the human diet) had some adverse effects on both the rats and the mice, particularly on their growth, their survival, and their susceptibility to stress. Sorbic acid seemed to be the least toxic. The toxic effect of the benzoic acid-sodium bisulfite mixture was greater than that of the individual components of the mixture. In contrast, the effect of the nisin-sorbic acid mixture was less than that of the components. When given alone, nisin increased growth rate, and sorbic acid exhibited some nutritional features of the vitamins.

As a result of their findings, the authors recommended that the use of sorbates be extended and that a maximum restriction be placed on the use of sodium bisulfite (and other sulfurous acid compounds) and benzoates as food preservatives. This recommendation has been accepted by the Food Hygiene Department of the Ministry of Health of the U.S.S.R. The authors also recommended that the use of nisin as a food preservative be limited--although they found that home-produced nisin was less toxic than imported nisin, it is still an antibiotic; it should be used only in combination with sorbic acid and only in some products.

[7 tables, 15 references]

3.12 (6.54) INFLUENCE OF SOME ADDITIVES TO FISH SAUSAGE MEAT ON ITS MOISTURE-RETAINING CAPACITY

Bykova, V. M. (U.S.S.R.)
Chemical Abstracts 73, No. 13 65135z (September 28, 1970)

2.3 FISH CONVEYOR APPARATUS

U.S. Patent 3,521,322
Michael, J., W. Wenzel; Nordischer Maschinenbau Rud. (pat.)
Food Technology 24, No. 12, 56 (December 1970)

The apparatus uses paired conveyor belts to carry the fish. FTP

3.15 RADIATION PASTEURIZATION OF FRESH AND BLANCHED TROPICAL SHRIMP

Kumta, U. S., S. S. Mavinkurve, M. S. Gore, P. L. Sawant, S. V. Gangal, and A. Sreenivasan (Biochemistry & Food Technology Division, Bhabha Atomic Research Center, Trombay, Bombay 85, India)
Journal of Food Science 35, No. 4, 360-363 (July-August 1970)

Radiation treatment of seafoods may affect the physical, chemical, and biological quality of the foods to a degree depending upon the radiation dose and the product involved. In the application of radiation preservation to fishing products ucts, then, it is important to define the optimum tolerance dose for each fishery product. In this study, the researchers determined the optimum tolerance dose for radiation pasteurization of tropical shrimp, including a combination process involving heat blanching and radiation. The effectiveness of the processes were evaluated by determining bacterial counts, chemical indices of spoilage, and organoleptic ratings of the test products.

Fresh, peeled and deveined shrimp of the species Metapenaeus affinis, Paenus indicus, and Paraenopsis stylifera were used. They were washed, dipped in 5% NaCl solution, then packed in "C" enamel cans or polyethylene pouches. Some of the shrimp were packed in the containers with added 3% NaCl solution. The packaged shrimp were irradiated at doses ranging from 0.15 to 1.0 Mrad. The samples were stored at 10°-12° C. and at 2°-4° C. The quality tests were carried out at intervals during the storage period.

Fresh, peeled and deveined tropical shrimp irradiated with a dose of 0.15 Mrad had a storage life at 10°-12° C. of 10-14 days; those treated at 0.25 Mrad

(over)

3.3344 A CAUSE AND MECHANISM OF BLUE DISCOLORATION OF CANNED CRAB MEAT--II. DETECTION OF HAEMOCYANIN IN THE BLUE MEAT

Inoue, Norio, and Terushige Motohiro (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 7, 692-694 (July 1970)

Earlier workers reported that hemocyanin or copper in hemocyanin is involved in the blue discoloration of canned crab meat. In part I, the authors reported a high content of copper in the joint section of boiled king crab meat. The present (part II) study of this series reports on hemocyanin in the blue discolored portions of canned king crab meat.

The authors found that both blue meat from canned king crab and heat coagulated hemocyanin gave positive hemocyaninlike reactions (detection of hemocyanin was by the modified method of Manwell and Baker, 1963 using dianisidine solution and 30% hydrogen peroxide). Normal crab muscle showed negative hemocyanin reaction, but the portion at the joints was positive. Hemocyanin, then, was found at that portion of the muscle of crab meat that contained the higher content of copper. They conclude that blue discoloration of crab meat is caused by the hemocyanin in the hemolymph. [1 table, 7 references]

3.2345 NEW RECOMMENDATIONS FOR PRESERVATION OF FISH BY FREEZING

Anderson, M. L. (Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Massachusetts 01930)
Commercial Fisheries Review 32, No. 10, 15-16 (October 1970)

During recent years, research has given us greater insight into the causes of toughening in fish during frozen storage. This article discusses the research findings--and uses these as a basis to recommend new freezing techniques.

Recommendations:

1. After fish are caught and, before they are processed, hold in ice those fish destined for freezing.
2. During period of iced storage before freezing, lower temperature of fish quickly to 32° F., and hold them at that temperature.
3. Freeze the fish as soon after capture as possible--preferably before onset of rigor.
4. When freezing fish, use very-quick-freezing techniques, such as can be obtained with liquid nitrogen, liquid carbon dioxide, or liquid Refrigerant 12.
5. While holding fish in frozen storage, do not at any time allow their temperature to rise above -20° F.

3.3344 pH OF CANNED CRAB MEAT.
I. STAGES IN THE MOLTING CYCLE IN RELATION TO pH

Motohiro, T., and N. Inoue (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Food Technology 24, No. 12, 71-73 (December 1970)

Usually the pH of canned crab meat packed in Japan runs from 6.8 to 7.4 but sometimes it goes over 7.4 to 7.8, even though the product was prepared from freshly caught and processed crab. In those packs with the higher pH values, some of the red pigments of the leg meat passes into the liquid portion and the white meat becomes reddish. Under these conditions the product fails to pass export inspection requirements even though its taste and texture are entirely satisfactory. The purpose of this study was to determine the cause of the high pH of some Japanese packs of crab meat. King crab, Paralithodes camtschaticus, and horse hair crab, Erimacrus isenbeckii, in two stages of molt (hard shell and paper shell) were used.

When paper shell crabs are used to prepare canned crab meat the pH of the canned product is usually higher than 7.6, but when only hard crabs are used the pH is about 6.8. The authors, therefore, concluded that the raw material used for preparing canned crab meat should not contain a large proportion of the paper shell crab. [5 tables, 7 references]

3.332 THREAD HERRING - POTENTIAL NEW FOOD INDUSTRY FOR GULF OF MEXICO WATERS

Waters, Melvin E. (Bureau of Commercial Fisheries [National Marine Fisheries Service] Technological Laboratory, P.O. Drawer 1207, Pascagoula, Mississippi 39567)
Fish Boat 15, No. 9, 37 (September 1970)

The standing crop of thread herring in the Gulf of Mexico has been estimated to be as much as 1,000,000 tons. Presently they are used a few months of the year by the fish-reduction industry, but, because they offer a tremendous potential as a food rich in proteins and minerals and because canned herring can be made readily available at a consistent price, food technologists at the Pascagoula laboratory have developed a sardine pack in which these fish are the basic constituent.

The method of processing the sardine pack is, in general, as follows: remove head, entrails, scales, and other extraneous matter; hold the dressed fish in a 10% brine for 1 hr.; drain the fish and place them in either 4- or 15-ounce sardine cans; add packing medium (peanut oil, corn oil, mustard sauce, tomato sauce, or brine); steam the open can for about 5 min.; seal and process according to established methods of time and temperature; cool the cans; and remove spilled packing medium by washing. Herring packed in each of the five media were evaluated by a consumer taste panel and by other interested groups. Comments on all types of the herring product were favorable.

A full description of the thread herring, its distribution, and the methods of catching it can be obtained from the Base Director, Exploratory Fishing and Gear Research Base, Pascagoula. Information about processing sardines from thread herring can be obtained from the Laboratory Director, Technological Laboratory, Pascagoula. [1 figure]

LB

3.5 CURING MIXTURES
(6.54)(3.4)

Cristea, E.
Industria alimentara 19, 88 (1968)
Food Manufacture 44, No. 4, p. 43 (April 1969)

Chemical and organoleptic tests were carried out to establish the best curing mixtures for meat used in fresh and half-smoked salami sausages and to find ways of reducing maturation times. A mixture containing sodium chloride with 0.5 percent sodium nitrite reduced ripening time by from 50 to 83 percent, depending on the temperature of the meat, and gave a better color than ordinary brine gives. Technical experiments with the mixture showed that its use would permit savings in auxiliary material, freezing energy, vessel depreciation, and room space. LB

3.4 LIQUID SMOKE COMPOSITION

U.S. Patent 3,523,802
Wandel, R. H., F. C. Olson, and W. J. Parker; Oscar Mayer & Co. (pat.)
Food Technology 24, No. 12, 66 (December 1970)

The liquid smoke composition is treated with a nontoxic oxidizing agent to oxidize its color-forming constituents. FTP

3.15

dose kept for 18-21 days. Shrimp that were not irradiated spoiled within 4 days. Heat blanched shrimp and heat blanched shrimp packed in brine had a storage (10°-12° C.) life of about 30 days; however, they did develop a musty odor and slimy texture. Blanched shrimp irradiated at a dose level of 0.15 Mrad were acceptable for 60 days when stored at 10°-12° C. and for 130 days when stored at 2°-4° C.; also, they did not develop a musty odor or slimy texture.
[4 figures, 2 tables, 30 references]

3.3344 A CAUSE AND MECHANISM OF BLUE DISCOLORATION OF CANNED CRAB MEAT--III. SULPHIDE REACTION OF CRAB HAEMOCYANIN

Inoue, Norio, and Terushige Motohiro (Laboratory of Marine Food Technology, Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 7, 695-697 (July 1970)

Earlier work (Gordievskaya, 1966) established that the blue discoloration of crab meat is caused by a copper-protein complex formed from the decomposition products (H_2S) of protein and the oxidation of hemocyanin (oxyhemocyanin). In the present study, the researchers demonstrated that the hemocyanin in the hemolymph of the crab can react with hydrogen sulfide to produce a blue colored pigment on heating at 100° C. for 15 min. Heat coagulated hemocyanin also reacted with hydrogen sulfide on heating to give a blue color. They conclude that, in the cannery, the cooked crab meat packed into cans contains active (but coagulated) hemocyanin which can react with hydrogen sulfide to give a blue discoloration to the canned product. [1 figure, 1 table, 4 references] FTP

3.336 CANNED FISH PRODUCT

Japanese Patent 11099/70
Chiyoda Kagaku Kogyosho KK. (pat.)
Food Technology 24, No. 11, 66 (November 1970)

Caseinates are used in canned fish products that have a tendency to produce struvite. FTP

3.2341 FISH FREEZING APPARATUS

British Patent 1,190,852
Veb Kuhlautomat (pat.)
Food Technology 24, No. 11, 66 (November 1970)

The apparatus has a continuous belt for conveying blocks of frozen fish. Cold air is passed over the blocks on the belt to maintain their frozen condition. FTP

3.4 REDUCTION OF 3,4-BENZOPYRENE CONTENT IN CURING SMOKE BY SCRUBBING

Moodie, I. M. (Fishing Industry Research Institute, University of Cape Town, Rondebosch, Cape Province, South Africa)
Journal of the Science of Food and Agriculture 21, No. 9, 485-488 (September 1970)

The purpose of this study was to determine the effect of scrubbing of curing smoke on its content of 3,4-benzopyrene (a carcinogen). A mixture of oak chips and sawdust was used as the wood smoke source. The smoke produced in the smoke generator was scrubbed by passing it through a recirculating water spray chamber. Additionally, the levels of 3,4-benzopyrene were determined in hake smoked with scrubbed and unscrubbed smoke. Analysis for 3,4-benzopyrene was carried out by gas chromatography; detection was by flame ionization. The results are shown in the following tables. Apparently, a commercial smoke scrubber can remove at least 70% of the carcinogen from wood curing smoke.

Sample	Level of 3,4-benzopyrene in sample
'Scrubbed' smoke condensate	0.32 mg./7.5 l.
'Unscrubbed' smoke condensate	1.1 mg./7.5 l.
Residue in condenser in the 'scrubbed' smoke line	0.89 mg.
Residue in condenser in the unscrubbed smoke line	4.20 mg.
Solid residue in the scrub water reservoir	3.34 mg./5.5 g.

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3.63 EFFECTS OF PROCESS VARIABLES ON RETENTION OF VOLATILES IN FREEZE-DRYING

Flink, J., and M. Karel (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139)
Journal of Food Science 35, No. 4, 444-447 (July-August 1970)

The quality of certain food items is largely dependent upon their content of volatile organic compounds that constitute the characteristic flavor. Loss of flavor volatiles can be lessened by low temperature processes such as freeze-drying. Nevertheless, researchers believe that flavor retention during freeze drying of foods will be improved by increasing the dissolved solids content, decreasing the ice front temperature, decreasing the freezing rate, and increasing the drying rate. The purpose of this study was to examine the influence of certain processing variables on the retention of volatiles during freeze-drying.

A model system was used consisting of a soluble carbohydrate, an organic volatile, and water. The carbohydrates and nonvolatile solids were glucose, maltose, sucrose, lactose, sodium chloride, and Dextran-10 (mol. wt. $\cong 10^4$). The volatiles were acetone, methyl acetate, methanol, ethanol, n-propanol, 2-propanol, n-butanol, tert-butanol, and n-pentanol. For the examination of effect of freezing rates, the prepared samples were frozen at -20° or -320° F. For the effect of drying temperatures, the samples were frozen in liquid nitrogen and then freeze dried at platen temperature of 120° F. and at 150° F. (chamber pressure in both cases was below 100μ).

(over)

4.19 (Card A) PHOSPHOLIPIDS OF MARINE ORIGIN. V. THE CRAB--A COMPARATIVE STUDY OF A MARINE SPECIES (CYCLOGRAPSUS PUNCTATUS) AND A FRESH WATER SPECIES (POTAMON)

De Koning, A. J. (University of Botswana, Lesotho and Swaziland, Roma, Lesotho, Southern Africa)
Journal of the Science of Food and Agriculture 21, No. 6, 290-293 (June 1970)

Part I through IV of this series of papers dealt with the phospholipids of hake, rock lobster, pilchard, and abalone. The present paper covers a marine species (crab) and its fresh-water counterpart. The author stated that the marine crab is common to the South African shores and the fresh-water crab is common to the rivers of Lesotho and Natal. The Lesotho crab (genus, Potamon) has not been classified as to species but resembles the Potamon sidneyi of Natal. The author compared, chemically, the phospholipid extracted from the two crabs.

The marine crab contained a phospholipid fraction that liberated 2-aminoethylphosphonic acid upon hydrolysis; the fresh-water crab did not contain this substance. The composition of the phospholipids of the crabs is shown in the following two tables.

(over)

4.19 (Card B) PHOSPHOLIPIDS OF MARINE ORIGIN. V. THE CRAB--A COMPARATIVE STUDY OF A MARINE SPECIES (CYCLOGRAPSUS PUNCTATUS) AND A FRESH WATER SPECIES (POTAMON)

De Koning, A. J. (University of Botswana, Lesotho and Swaziland, Roma, Lesotho, Southern Africa)
Journal of the Science of Food and Agriculture 21, No. 6, 290-293 (June 1970)

Class of phospholipid	Composition of the phospholipids of:	
	Marine crab	Fresh-water crab
	%	%
Phosphatidyl choline	57	52
Phosphatidyl ethanolamine	22	27
Phosphatidyl serine	5	2
Phosphatidyl inositol	4	4
Lyso phosphatidyl choline	1	1
Sphingomyelin	5	4
Cardiolipins	5	10
Ceramide aminoethylphosphonate	1	nil

Note: Content of each constitutent is in % of total phospholipids.

[1 figure, 4 tables, 13 references]

3.63

Under the experimental conditions used, slow freezing and decreasing sample thickness promoted retention of organic volatiles in freeze-dried samples of solutions of mono-, di-, and polysaccharides and the organic volatiles. The influence of platen temperature and concentration of the components in the solution was complex. The effects of process variables were explained as follows: Microregions are formed due to the association of carbohydrate molecules; the regions become impermeable to organic compounds when their water content decreases below a certain critical level. [1 figure, 5 tables, 13 references]

3.63 DRIED FISH PRODUCT

Japanese Patent 14869/70
Nakamura, T. (pat.)
Food Technology 24, No. 11, 66 (November 1970)

Fish are cooked in boiling water or in steam, then immersed in cold salted water, and finally dried in moving air at less than 0° C. FTP

3.63 MEAT AND FISH PRESERVATION
(3.12)

Japanese Patent 9206/70
Fassen Shoe Maker Holding NV (pat.)
Food Technology 24, No. 11, 66 (November 1970)

The foods are contacted with an aqueous solution of amino acids before dehydration and subsequent storage. FTP

3.4

Description of samples of smoked hake				Level of 3,4-benzopyrene in the smoked hake
Source	Smoking condition	Wood burning zone temperature	Smoking chamber temperature	
		°C.	°C.	mg./kg.
Laboratory	Scrubbed smoke	--	39	0.09
	Unscrubbed smoke	450	53	0.25
	Unscrubbed smoke	625	73	0.36
Industry	Scrubbed smoke	--	--	0.05
	Unscrubbed smoke	--	--	0.63

[1 figure, 3 tables, 15 references]

3.4 SMOKE PRODUCING TABLETS

U.S. Patent 3,492,134
Brummendorf, L. (pat.)
Food Technology 24, No. 11, 60 (November 1970)

Smoke producing tablets are prepared by compressing mixtures of sawdust and spices that have been dried to a moisture content of 7-9%. FTP

4.12 COMPOSITION OF FATTY ACIDS IN COELACANTH OIL

Tsuyuki, Hideo, and Shingo Itoh (Department of Food Engineering, Faculty of Agriculture and Veterinary Medicine, Nihon University, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 8, 788-790 (August 1970) (In Japanese; summary and tables in English)

The authors report the following fatty acid composition of coelacanth (Latimeria chalumnae) oil.

Fatty acids in coelacanth oil

Fatty acid[1/]	Weight %	Fatty acid[1/]	Weight %
10	0.2	18	2.9
10-1	0.1	18-1	24.4
12	0.2	18-2	1.4
12-1	0.1	18-3	1.1
13	0.8	18-4	2.9
14	2.7	19	0.9
14-1	1.2	20-1	3.5
14-2	1.0	20-2	1.5
15	0.7	20-4	1.9
16	10.6	20-5	8.1
16-1	4.9	22-1	3.2
16-2	0.9	22-5	4.6
16-3	0.8	22-6	19.4

1/ First number is the number of carbons and the second number is the number of double bonds in the fatty acid. [3 tables, 4 references] FTP

4.19

Fatty Acid	Composition of:			
	Phospholipids		Nonphosphorylated lipids	
	Marine crab[a/]	Fresh-water crab	Marine crab	Fresh-water crab
	%	%	%	%
14:0[b/]	3	1	5	2
14:1				2
15:0			1	
16:0	14	15	21	17
16:1	3	2	11	10
16:2 and 17:0	2	1	3	1
18:0	11	12	4	4
18:1	22	23	29	29
18:2	4	12	6	23
20:0	1	1		
20:1	3	2	5	6
20:4	8	3	1	
20:5	8	11	5	2
22:5	4			
22:6	17	18	9	4

a/ Showed trace of C:24 fatty acids.
b/ Number of carbon atoms: number of double bonds.
Note: Content of each acid is in % of corresponding methyl ester.

(Continued on Card B)

6.31 (2.141) CARTOGRAPHIE DES POPULATIONS DE LAMINAIRES DES CÔTES FRANÇAISES DE LA MANCHE ORIENTALE [CARTOGRAPHY OF THE LAMINARIA POPULATIONS ALONG THE FRENCH COAST OF THE ENGLISH CHANNEL]

Audouin, J., and R. Perez
Science et Pêche, No. 194, 1-11 (July-August 1970) (In French)

Knowledge about the location and the extent of algal fields is extremely limited, especially about those of the populations that never come to the surface. This lack is most regrettable since many of the fields could provide industry with a supply of excellent quality material. For this reason, the authors determined to map the laminaria populations along the French coast of the English Channel. They used three means of determining precisely what species were present: taking color photographs from a light plane, dredging in the sea, and excursions along the shores at low tide. From the results, they conclude that aerial mapping is the most rapid and efficient means of establishing cartograms by means of which seaweed harvesters can choose new and profitable places of collecting rather than being forced to invest time in an area haphazardly or to return continuously to already familiar fields. [10 figures]

6.4 URETHANE POLYMERS FROM HYDROXYLATED FISH OIL

Hustad, G. O., T. Richardson, and C. H. Amundson (Department of Food Science, University of Wisconsin, Madison 53706)
Journal of the American Oil Chemists' Society 47, No. 9, 333-336 (September 1970)

The purpose of this study was to examine the properties of hydroxylated fish oil and urethane polymers prepared from the hydroxylated oils in an effort to find expanded uses for fish oil. Alewife fish oil was hydroxylated by performic [Swern, Billen, Findley, and Scanlan, J. Amer. Chem. Soc. 67, 1786-1789 (1945)], peracetic acid [Findley, Swern, and Scanlan, J. Amer. Chem. Soc. 67, 412-414 (1945)], and pertungstic acid [Luong, Schriftman, and Swern, Jr. Amer. Oil Chem. Soc. 44, 316-320 (1967)]. The products obtained were examined for yield, free acid, hydroxyl number, saponification value, and peroxide value.

The fish oils oxidized with performic acid gave high yields (83% to 95%), low acid values (0.12 to 0.19), high hydroxy numbers (142 to 245), high saponification numbers (247 to 271), and relatively low peroxide values (72 to 266).

Performic acid hydroxylated alewife and menhaden fish oils were used to prepare urethane foams. The foams had characteristic low compressive strengths at 10% deflection (6.4 to 9.5 psi), low density (1.45 to 1.65 pcf), high porosity (0.7% to 1.7% closed cells), and high water absorption compared to a conventional polyether urethane foam.

The researchers also further refined the performic acid hydroxylated oil from the alewife, using cation and anion exchange resins, for preparing urethane elastomers. The polymers exhibited higher tensile and Graves tear strengths than a comparable castor oil elastomer (control). The dielectric strengths of the elastometers from the fish oil and from castor oil were similar, but the

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6.54 EFFECT OF DRYING TEMPERATURE ON QUALITY OF FISH PROTEIN

Yáñez, E., Digna Ballester, and G. Donoso (Laboratory of Nutrition, School of Public Health, Av. Independenca 939, Santiago, Chile)
Journal of the Science of Food and Agriculture 21, No. 8, 426-428 (August 1970)

The authors state that considerable interest exists in Chile over the possibility of enriching foods with protein concentrates prepared from local fish. This paper reports on the chemical composition and biological value of samples of hake (Merluccius gayi) fillets dried by three methods under laboratory conditions.

Fresh hake fillets were dried under three different laboratory conditions: (1) by freeze-drying (2) by oven drying at 105° C. for 6 hr., and (3) by oven drying at 170° C. for 6 hr. The dried materials were then ground. The samples were analyzed for proximate composition and for net protein utilization and net sulfur utilization.

The proximate composition of the dried fillets is shown in table 1 and some results of the biological tests are in table 2.

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6.81 (9.16) PAPUA PEARL CULTURE FARM IN PRODUCTION

Anonymous (Department of External Territories, Canberra, Australia)
Australian Fisheries 29, No. 8, 2-4 (August 1970)

The pearl-culture farm now in full-scale operation near Port Moresby, Territory of Papua and New Guinea, is providing employment for an increasing number of local people. Although the Papuans and New Guineans are not yet able to do the highly technical laboratory work of incision, grafting, and X-ray examination, they are very effective in basket, raft, and other marine work. Plans are underway to give them scholarships to work at the farm and learn the scientific side of the industry.

In the fall, live pearl oysters are shipped from Australia to the farm in a special carrier ship. They are suspended in baskets in the sea for about 6 months, then taken to an operating room for examination. Those that are sufficiently healthy and rested are taken through the intricate steps of the round-pearl operation, after which they have to be tended just as sick people are--turned from side to side in their submerged baskets and put in different positions for several days. At intervals, they are examined under X-ray fluoroscope. Oysters that have accepted the nucleus are returned to the water until X-ray examination shows the round pearl is ready for extraction. Some healthy oysters can produce another cultured pearl. Oysters that have rejected the implanted nucleus are used for half-pearl production. In this operation, three or four nuclei, which are made from pig-toe mussel shell shaped like a half marble, are glued to

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6.4

tensile elongation at break point was greater for the elastomers from castor oil. Further, when the isocyanate index of the elastomers from fish oil was increased from 105 to 156, the Graves tear strength showed the greatest change.

The authors state that the elastomers from fish oil were harder, less elastic, and more resistant to tearing than were the elastomers from castor oil with comparable isocyanate indices. [5 tables, 17 references]

6.19 (8.) INGREDIENT ANALYSIS TABLE

Allen, Richard D. (National Grain Co., Ltd., Winnipeg, Manitoba, Canada)
Feedstuffs (Yearbook Issue) 42, No. 44, 86-92 (October 28, 1970)

This year's Ingredient Analysis Table gives data on 96 feed ingredient items. The data on each item include: dry matter, protein, fat, fiber, calcium, phosphorus, ash, ruminant T.D.N., ruminant digestible protein, N.E. (NEM + NEP), poultry P.E., poultry N.E., swine M.E., swine T.D.N., methionine, cystine, lysine, tryptophane, threonine, isoleucine, histidine, valine, arginine, phenylalanine, glycine, poultry amino-acid availability, vitamin A, vitamin E, thiamin, riboflavin, pantothenic acid, biotin, folic acid, choline, vitamin B12, niacin, sodium, potassium, magnesium, manganese, iron, copper, zinc, and selenium. Eleven fish meals (herring, menhaden, anchovie, redfish, sardine, tuna, white [whitefish?], alewife, sheepshead, mario, tullibee) and one fish solubles are listed.

[1 table, 27 references] FTP

6.37 (5.12) BREAKDOWN OF CAROTENE DURING DRYING OF CYSTOSEIRA BARBATA AND STORAGE OF SEAWEED MEAL

Atay, Dogan (Dep. Anim. Nutr., Univ. Ankara, Ankara, Turkey)
Chemical Abstracts 72, No. 19, 99364t (May 11, 1970)

6.81

the inside of each oyster shell. In about 9 months, the engrafted mantle covers the nuclei with nacre and the half-round pearls are ready to be drilled off. This process, of course, kills the oyster. The cultured pearls, round and half round, are sent to Japan for processing and distribution to world markets.

A considerable amount of research work is being done at the farm. The feeding habits of the oysters, the types of plankton and their suitability as food, water temperatures and salinity as influences on the growth of both the oyster and the nacre, the effects of suspension at various depths on the growth of shells and pearls, the optimum number of oysters per raft, and the means of protecting the oysters from parasites are all under continuing investigation.

[8 photographs]

6.32 (6.36) THE TOCOPHEROL, VITAMIN K, AND RELATED ISOPRENOID QUINONE COMPOSITION OF A UNICELLULAR RED ALGA (PORPHYRIDIUM CRUENTUM)

Antia, N. J. (Fisheries Research Board of Canada, Vancouver Laboratory, Vancouver, B.C.), I. D. Desai and M. J. Romilly (Division of Human Nutrition, School of Home Economics, University of British Columbia, Vancouver)
Journal of Phycology 6, No. 3, 305-312 (September 1970)

Interest in the nutritive value of unicellular algae to man and to members of the marine food chain prompted the authors to examine the production of vitamins by certain readily cultivable species of marine plankton. They therefore extracted the total lipids from cells of P. cruentum, fractionated them into neutral and polar lipids, and chromatographically analyzed the neutral fractions. They found plastoquinones A and C, vitamin K_1, ubiquinone-10, α-tocopherol, and α-tocopherolquinone in photoautotrophically grown alga; they found the same quinones but no tocopherol in alga grown photoheterotrophically on glycerol. Isolation and estimation analyses revealed that the substances occurred in the following order of concentration: in the autotrophic culture--plastoquinone A > vitamin K_1 > ubiquinone-10> plastoquinone C, α-tocopherolquinone, α-tocopherol; in the heterotrophic culture--plastoquinone A > ubiquinone-10 > vitamin K_1 > plastoquinone C, α-tocopherolquinone. Although the overall quinonoid composition (except for the absence of plastoquinone B) was generally that reported by several investigators for multicellular members of Rhodophyta, the concentration of total lipids was markedly lower. [4 figures, 2 tables, 37 references] LB

6.54

Table 1. Chemical composition

Samples of dried hake (Merluccius gayi)	Ash	Protein (N X 6.25)	Sulfur	Ether Extract	Available lysine
	(g./100 g.)	(g./100 g.)	(mg./100 g.)	(g.%)	(g./100 g. crude protein)
Freeze-dried fillets	7.8	91.3	997	0.31	8.6
Oven-dried (at 105° C.) fillets	8.0	90.0	962	0.23	8.3
Oven-dried (at 170° C.) fillets	8.1	92.5	1063	0.21	6.9

Table 2. Biological Values

Samples of dried hake (Merluccius gayi)	True digestibility of N	Net protein utilization (NPU)	True digestibility of S	Protein efficiency ratio (PER)	Net protein ratio (NPR)
	(%)		(%)		
Freeze-dried fillets	94.3	79	90	2.9	4.6
Oven-dried (at 105° C.) fillets	89.3	77	82	2.5	4.4
Oven-dried (at 170° C.) fillets	74.2	51	66	0.8	3.0

[4 tables, 20 references]

7.42 (9.19) ENVIRONMENTAL MERCURY: RAPID DETERMINATION IN WATER AT NANOGRAM LEVELS

April, Robert W., and David M. Hume (Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139)
Science 170, No. 3960, 849-850 (November 20, 1970)

Nanogram to microgram amounts of mercury in small samples can be determined by plasma emission spectroscopy. The technique basically involves flame photometry with the flame replaced by a radiofrequency plasma in helium at atmospheric pressure. The authors state that the effective sensitivity of the method is over 1,000 times that of conventional hydrogen-oxygen flame emission. The useful working range of the procedure is 1 p.p.b. to 1 p.p.m. of mercury in 10 ml. of sample; the limit of detection is about 2 nanograms. [2 figures, 1 reference]

7.8 (8.8) SOME PERSONALITY TRAITS RELATED TO PERFORMANCE IN A REPEATED SENSORY TASK

Henderson, D., and M. Viasey (School of Home Economics, University of Manitoba, Winnipeg 19, Manitoba, Canada)
Journal of Food Science 35, No. 4, 407-411 (July-August 1970)

It is known that variability in performance of judges is a problem in sensory testing of foods. This study was carried out to determine whether an assessment of the personality traits of judges would be useful in predicting their sensory performance. The researchers used the short version of the Personality Research Form (Research Psychologists Press, Goshen, New York) developed by D. N. Jackson (Manual for the Personality Research Form, Bull. 43, Department of Psychology, University of Western Ontario, London, Ontario, Canada.) to select 56 judges from a sampling population of 500 senior high school students. The personality variables measured were nurturance, dominance, harmavoidance, play, exhibition, achievement, autonomy, impulsivity, social recognition, understanding, order, aggression, endurance, desirability, and infrequency. The sensory task involved the discrimination of flavor in plain cakes made with four different forms of eggs (fresh, spray-dried, irradiated spray-dried, 50-50 blend of irradiated and nonirradiated spray-dried).

The results suggest that scores from personality tests might be useful in selecting taste panel members. The judges with high scores in need for achievement performed better in flavor difference detection tests than did judges with low

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7.51 (6.54) ASSESSMENT OF THE NUTRITIVE VALUE OF HEATED FISH PROTEIN CONCENTRATES (FPC) BY A SIMPLE IN VITRO PEPSIN DIGESTION PROCEDURE

Knipfel, J. E., H. G. Botting, and J. M. McLaughlan (Nutrition Research Division, Food and Drug Research Laboratories, Ottawa, Ontario, Canada)
Journal of the Association of Official Analytical Chemists 53, No. 5, 964-967 (September 1970)

This paper describes a simple in vitro pepsin digestion procedure that could be used by quality control laboratories for assessing the nutritive value of processed fish protein concentrate. [1 figure, 2 tables, 13 references] FTP

[3 figures, 3 tables, 13 references] FTP

The paper describes an automated method for the analysis of protein in meat. The work involved the selection of proper standards, development of a method for presolubilizing meat samples for presentation to the AutoAnalyzer, and the construction of manifolds for the AutoAnalyzer to give results for protein comparable to those obtained by the official AOAC Kjeldahl method. The method could be applied to meat and meat products that had protein contents ranging from 5% to 25%.

7.51 AUTOMATION OF METHODS FOR MEAT AND MEAT PRODUCTS. I. DETERMINATION OF PROTEIN

McNeal, Jon E., Albert Karasz, and Elmer George, Jr. (New York State Department of Agriculture and Markets, State Food Laboratory, Albany, N.Y. 12226)
Journal of the Association of Official Analytical Chemists 53, No. 5, 907-910 (September 1970)

7.8 (8.8) OBJECTIVE EVALUATION OF CANNED TUNA SENSORY QUALITY

Rasekh, Jamshid, and Amihud Kramer (University of Maryland, College Park, Maryland), and Roland Finch (Bureau of Commercial Fisheries, Terminal Island, California)
Journal of Food Science 35, No. 4, 417-423 (July-August 1970)

There are no Federal Grades and Standards for canned tuna, and no system exists to determine the relative importance of each factor of quality of the canned fish or to measure the quality factors by instrumental methods. This study, therefore, was designed to determine, by use of regression analysis, the relative importance of the various factors that contribute to the quality of canned tuna and to find objective tests by which each quality factor, and overall consumer preference, could be measured. Commercial and experimental packs of canned tuna were prepared during 1965, 1966, and 1967.

The samples prepared in 1965 were used to train a panel of seven. The panel identified eight factors of quality of canned tuna: scorch, color, flakiness, firmness, juiciness, fibers, odor, and taste. Color, flakiness, firmness, and fiber could be predicted adequately ($R = 0.9^{+}$) by objective tests. Scorch, juiciness, odor, and taste were predicted less completely ($R = 0.8 - 0.9$) by one or a combination of objective tests. The test samples prepared in 1967 were examined both by the expert panel and by a consumer panel. Consumer preference of canned tuna, apparently, depends largely upon appearance and flavor and to a lesser extent upon texture. The authors found that consumer preference could be estimated objectively by determining Hunter L and b (color) values, a shear test,

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7.85 (6.139) OXYTETRACYCLINE-GLUCOSE-YEAST EXTRACT AGAR FOR SELECTIVE ENUMERATION OF MOULDS AND YEASTS IN FOODS AND CLINICAL MATTER

Mossel, D. A. A., A. M. C. Kleynen-Semmeling, and H. M. Vincentie (Central Institute for Nutrition and Food Research TNO, Zeist, The Netherlands), and H. Beerens and M. Catsaras (Institut Pasteur, Lille, France)
Journal of Applied Bacteriology 33, No. 3, 454-457 (September 1970)

The subject agar (Mossel, Visser, and Mengerink, 1962) was tested on about 3,500 samples of foods (including 200 samples of fish flour) rich in Bacillus spores and containing low but significant numbers of molds. Its performance as a selective enumeration medium was considered excellent, since it entirely suppressed the growth of acid-tolerant bacteria without impairing the quantitative development of the molds and yeasts. [1 table, 16 references] LB

7.591 (1,89) CARBOHYDRASES OF MARINE INVERTEBRATES. ISOLATION OF LITTORINA MANSCHURICA CELLULASE BY GEL FILTRATION ON BIOGELS IN THE PRESENCE OF A SUBSTRATE

Elyakova, L. A., V. V. Sova, E. P. Postnikova, V. E. Vas'kovskii, M. D. Martynova, and O. S. Chizhov (Inst. Biol. Aktiv. Veshch; Vladivostok, U.S.S.R.)
Chemical Abstracts 73, No. 11, 52457f (September 14, 1970)

7.8

scores in this personality variable. The "high achievers" showed significantly superior odd sample selection and somewhat better discrimination of moderately difficult comparisons than did the "low achievers." The degree of difference in flavor expressed by the judges showed a dependence on the personality scores for aggression, nurturance, autonomy, harmavoidance, and impulsivity.
[5 figures, 6 tables, 16 references]

7.85 (7.86)(1.80) A SIMPLIFIED METHOD FOR QUANTITATIVE MICROBIOLOGICAL EXAMINATION OF DEEP FROZEN SEAFOODS

Mitchell, N. J. (Public Health Laboratory, West Park Hospital, Epsom, Surrey, England)
Journal of Applied Bacteriology 33, No. 3, 523-527 (September 1970)

The common practice in the microbiological examination of deep frozen shellfish intended for human consumption is to homogenize the tissue, either manually (which is tedious) or mechanically (which requires a number of blenders when many samples are regularly examined). The author hypothesized that an examination of exuded tissue juice would be a simple, time-saving alternative. By examining a number of samples in parallel of cooked or raw prawns, shrimp, and lobsters, he compared the method with that based on mechanical homogenization. The results were not significantly different. With the new method, he could consistently distinguish between seafoods that would be accepted with or without condition by public health authorities. Results of qualitative bacterial examinations, also, were equal to those given by examination of homogenates. Moreover, examination of the juice eliminates the need to weigh samples and to use several sterilized blenders. As a result of the latter, more samples can be examined at a time than if blenders are used. [1 figure, 4 tables, 4 references] LB

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fiber content, and pH and using the following multiple regression equation:
C = -4.918 - 0.0431L + 0.224b + 0.00345S - 0.0706F + 0.804P (where C = consumer preference; L = Hunter L test; b = Hunter b test; S = shear test; F = fiber test; and P = pH.) FTP

7.8

7.53 FAT DETERMINATION--A NEW PHYSICAL METHOD

Bittenbender, C. D. (Schluderberg-Kurdle Co., Inc., Baltimore, Maryland)
Journal of Food Science 35, No. 4,460-463 (July-August 1970)

The paper describes a method for determining the fat content of meat products (sausages) based on the precise measurement of the relative density of a solution of the fat contained in a sample in a constant volume of a solvent (heptane). The fat is extracted from the comminuted meat by the heptane in the presence of a desiccant and filter aid and separated by filtering the solution of fat and heptane. The relative density of the heptane-fat solution is measured by specially constructed hydrometers. The fat content is then determined by use of a standard curve--the standard curve having been previously developed by use of known quantities of pure fat in the solvent. [4 figures, 5 tables] FTP

7.45 AUTOMATION OF METHODS FOR MEAT AND MEAT PRODUCTS. II. DETERMINATION OF PHOSPHORUS

McNeal, Jon E., Albert Karasz, and Elmer George, Jr. (New York State Department of Agriculture and Markets, State Food Laboratory, Albany, N.Y. 12226)
Journal of the Association of Official Analytical Chemists 53, No. 5, 911-912 (September 1970)

An automated method is described for the analysis of phosphorus in meat, to be used simultaneously with the automated nitrogen determination described in Part I [McNeal, Jon E., Albert Karasz, and Elmer George, Jr., Journal of the Association of Official Analytical Chemists 53, No. 5, 907-910 (September 1970)]. The work involved the proper connection to the nitrogen manifold, construction of a phosphate manifold, and the preparation of standards to give results comparable to those obtained by the AOAC gravimetric method using quinoline molybdate. The method was applicable to meat and meat products that had total phosphorus contents ranging from 0.05% to 0.4%. FTP

7.599 ESTIMATION OF EMULSIFICATION OF HYDROCARBONS IN CULTURE FLUIDS

Katinger, H., A. Nobis, and J. Meyrath (Hochsch. Bodenkult., Inst., Angew. Mikrobiol., Vienna, Austria)
Chemical Abstracts 73, No. 11, 52972v (September 14, 1970)

7.599 GAS CHROMATOGRAPHY IN THE STUDY OF BIOLOGICAL SEDIMENTS

Tibaldi, Ettore (Ist. Zool., Univ. Milano, Milan, Italy)
Chemical Abstracts 72, No. 17, 86992w (April 27, 1970)

8.42 (9.19) DETERMINATION OF SUBMICROGRAM QUANTITIES OF MERCURY IN LAKE WATERS

Chau, Yiu-Kee, and Hirohumi Saitoh (Canada Centre for Inland Waters, Burlington, Ontario, Canada)
Environmental Science & Technology 4, No. 10, 839-841 (October 1970)

This article describes a simple and sensitive method for the determination of submicrogram quantities of mercury in lake water using a combination of concentration of the mercury by dithizone extraction and atomic absorption of mercury vapor. The mercury is extracted from the water with dithizone (dissolved in chloroform), back extracted (to transfer the mercury from the chloroform phase back to an aqueous phase) by hydrochloric acid, then converted to vapor by a reduction-aeration reaction (using stannous chloride and the modified closed-system aeration technique of Hatch and Ott, 1968). The extraction method removes Hg, Hg_2^{2+}, Hg^{2+}, and some organomercuric compounds. Details of the apparatus used and the reagents are given. The method was sensitive to 0.008 µg. per liter (0.008 p.p.b.). The standard deviation for a lake water sample containing 0.478 µg. of mercury per liter of water was 0.0087, and for a lake water sample containing 0.0048 µg. of mercury per liter it was 0.0042. [2 figures, 1 table, 12 references]

8.8 (7.8) (1.85) EFFECT OF FREEZE-DRYING AND COOKING ON SHRIMP QUALITY

Moorhouse, Barbara R., and Harold Salwin (Division of Food Chemistry and Technology, Food and Drug Administration, Washington, D.C. 20204)
Journal of the Association of Official Analytical Chemists 53, No. 5, 899-902 (September 1970)

In earlier (1964-65) laboratory tests (reports unpublished) Salwin and his coworkers found that freeze-drying shrimp that were spoiled removed some of the decomposition odors and improved the organoleptic quality of the product. Apparently freeze-drying resulted in loss of amines, headspace volatiles, and volatile reducing substances. The purpose of the present experiment was to determine the effect of cooking and freeze-drying the shrimp on a semicommercial scale on the quality of the product. The samples and products were examined organoleptically (odor only), chemically (pH, indole, volatile acids, lactic acid, succinic acid, total volatile bases, ammonia, trimethylamine), and bacteriologically (aerobic plate count).

Five hundred pounds of white shrimp were stored in crushed ice until they decomposed. At appropriate intervals during this period, samples were removed for processing by freeze-drying. Three quality levels of shrimp were used based on their odor: (1) passable, (2) first stage of decomposition, and (3) advanced stage of decomposition. One portion of shrimp from each of the three quality groups was freeze dried raw and another portion from each group was freeze dried after cooking. The various tests were carried out on products representing the

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9.125 (1.953)(4.14) (4.3) FUNCTION OF THE SPERMACETI ORGAN OF THE SPERM WHALE

Clarke, Malcolm R. (National Institute of Oceanography, Wormley, Godalming, Surrey, England)
Nature 228, No. 5274, 873-874 (November 28, 1970)

Asdic records show that sperm whales often dive to depths of over 1,000 m. During these dives, they may pass from water having a temperature of 22.3° C. and a density of 1.0245 into water having a temperature of 7.8° C. and a density of 1.02703. The effect of such a change on a 35-ton whale, say, would be an increase in lift of about 1,800 lb., no other factors considered. If the whale had no buoyancy-regulating mechanism, he would have to swim down throughout the dive (30 min. or so) to counteract the lift. Since nothing about a whale's shape suggests that he is hydrodynamically adapted for such behavior, the author assumed that some physiological structure or property controls the buoyancy.

Estimates of the weights of spermaceti in several whales indicate that a 44-ft. whale weighing 31,435 kg. contains about 1,450 kg. of spermaceti oil. At the surface, the temperature of this oil is 33.5° C. If the oil is cooled by sea water to the ambient temperature, the temperature would be 7.8° C. at a depth of 1,000 m. The lift of the whale, then, would be changed as follows:

$$\text{Lift} = \text{weight of spermaceti} \times \left[\frac{\text{density of sea water at } 22.3^\circ \text{ C.}}{\text{density of oil at } 33.5^\circ \text{ C.}} - \frac{\text{density of sea water at } 7.8^\circ \text{ C.}}{\text{density of oil at } 7.8^\circ \text{ C.}}\right] = 1{,}450 \times \left[\frac{1.0245}{0.8585} - \frac{1.02703}{0.9087}\right] = 91.5 \text{ kg.}$$

9.15 EFFECT OF FOOD-PROCESSING METHODS UPON SURVIVAL OF THE TREMATODE HETEROPHYES SP. IN FLESH OF MULLET CAUGHT FROM BRACKISH EGYPTIAN WATERS

Hamed, M. G. E., and A. N. Elias (Food Technology Division, National Research Centre, Cairo, Egypt)
Journal of Food Science 35, No. 4, 386-388 (July-August 1970)

The mullet caught from certain lakes in Egypt are infected with the trematode Heterophyes heterophyes. The purpose of the present study was to determine the effect of various food-processing procedures on the survival of the parasite in the flesh of the mullet.

The organism could survive for 30 hr. when the infected fish were stored at -10° or -20° C. and for 9 days when the fish were stored at 6° C. Dipping the infected fish in chlortetracycline solution (30 p.p.m.) for 2 hr. did not affect the viability of the parasite. The parasite lived for 180 min. in mullet kept at 50° C. and for 10 min. in mullet kept at 100° C.

[4 figures, 2 tables, 7 references]

8.8

three quality levels with each of four groups (raw, frozen; raw, freeze-dried; cooked, frozen; cooked, freeze-dried).

Samples of shrimp that were at the stage of incipient decomposition before processing were rated passable after they were cooked or freeze dried. Those that were at the stage of advanced decomposition before processing showed improvement (odor) after processing (cooking or freeze-drying) but were not passable.

The number of aerobic bacteria (counts) increased during iced storage of the shrimp, but cooking or freeze-drying reduced the bacterial count considerably.

The chemical tests failed to provide a basis for evaluating the quality of the products.

The authors suggest that additional work is needed on methods for end product testing because the organoleptic, bacteriological, and chemical tests on the finished shrimp products failed to reveal the quality (or decomposed condition) of the starting material (shrimp). [3 tables, 11 references]

8.50 MONTHLY VARIATION IN CONTENT OF WATER, PROTEINS, (6.130) EXTRACTABLE LIPIDS, AND TOCOPHEROL IN CHILEAN ANCHOVIES (ENGRAULIS RINGENS)

Cavicchioli Barrera, Gilda, and Eugenia Miller Aguilera
Chemical Abstracts 72, No. 23, 118799g (June 8, 1970)

8.59 RENDIMENTO DE CARNE DO CEFALOTORAX DA LAGOSTA PANULIRUS ARGUS (LATREILLE) [YIELD OF MEAT FROM THE CEPHALOTHORAX OF SPINY LOBSTER, PANULIRUS ARGUS (LATREILLE)]

Da Costa, Raimundo Saraiva (Laboratorio de Ciências do Mar, Universidade Federal do Ceará, Fortaleza, Ceará, Brasil)
Boletim de Ciências do Mar No. 22, 6 pp. (1969) (Laboratorio de Ciencias do Mar, Universidade Federal do Ceara, Brasil) (In Portuguese; English summary)

In this paper the yield of meat from the cephalothorax of 100 spiny lobsters (Panulirus argus, Latreille) is analysed.

Each fresh cephalothorax was measured, weighed, and boiled (in order to facilitate extraction of the meat). Meat was extracted with hand tools.

The following average yield, in total cephalothorax weight percentage, was observed: cooked meat extracted from antennules, antennae, and mouth parts = 5.7%; walking legs = 7.2%; rostrum, sternum, and exoskeleton of the branchial region = 13.6°. The total yield of cooked meat extracted from the cephalothorax was 26.5% of the fresh weight. [1 figure, 1 table, 1 reference] Extracter: LB

8.42 COMMON STRONTIUM CONCENTRATION OF MINERALIZED TISSUES FROM MARINE AND FRESH WATER ANIMALS

Rosenthal, Harold L., Maura M. Eyes, Olive A. Cochran (Sch. of Dent., Washington Univ., St. Louis, Missouri)
Chemical Abstracts 72, No. 19, 97713g (May 11, 1970)

9.16 (0.8) CONCEPT FOR A SELF-CONTAINED OCEANIC RESOURCES BASE

Green, Jack (Consultant to the Institute for the Future, New York, N. Y. 10019)
Marine Technology Society Journal 4, No. 5, 88-101 (September-October 1970)

The author describes his concept of a self-contained oceanic resources base drawing its energy from the Cromwell Current (Pacific Ocean). He suggests that the Cromwell Current could energize an array of combination Venturi tubes and low-head turbines of 30 meters or less radius at a depth of between 35 and 100 meters.

The Cromwell Current along the Equator flows below the surface of the Pacific Ocean at a rate of about 150 cm./sec. One low-head turbine (30 meter radius) could possibly yield 6,400 kilowatts. The paper outlines the design concepts of such turbines. Also modified turbines could raise deep nutrient-rich waters and fine sediments to the surface of the base where artificial fishing banks could be formed. A jet-siphon unit could be used to pump up coarse sediments and mineral nodules. In addition, the base might provide a piston type rocket launch site to explore the planets. Turbine energy would be available for conversion of sea water to fresh water and for the transmission of power to nearby countries.
[20 figures, 4 tables, 57 references] FTP

9.125

Thus as the oil freezes and contracts, it could balance the increase in density of the sea water.

For the spermaceti to return to 33.5° C., it is heated primarily by the blood and, to some extent, by ambient water temperature. About 1.6×10^4 kcal. are required to raise 1,450 kg. of spermaceti oil from 7.8° to 33.5° C. Estimates of the total energy available to the whale during a dive (made from the volume of air breathed between deep dives) indicate that sufficient heat is generated to reheat the spermaceti. The suggested sequence of events is as follows. (1) At the surface, the oil is at about 33° C. At the beginning of the dive, the lungs may be emptied, and dilation of the blood vessels of the skin leads to rapid cooling of the junk spermaceti; water passing into the nare cools the case spermaceti. At depth, circulation in the spermaceti and skin is reduced by vasoconstriction and bradycardia until the spermaceti temperature is just adequate to maintain neutral buoyancy. (2) Heat produced during swimming is stored in the body of the whale. (3) When the whale begins to reach the limit of its endurance, the blood vessels dilate, heart rate increases, and blood begins to flow into the spermaceti. As the spermaceti melts and becomes less dense, the whale is automatically carried to the surface.

The function of the spermaceti organ, then, is to provide a system whereby the whale (and possibly other cetaceans) can maintain nearly neutral buoyancy both at the surface and at great depths and can, through temperature-control of the spermaceti, rise to the surface from great depths without physical effort.
[1 figure, 9 references]

9.16 (0.8) FISH FARM ENCLOSURES. 8--ESTIMATES OF NET AND BARRIER COSTS

Milne, P. H.
World Fishing 19, No. 7, 37-38, 41 (July 1970)

In this final article of the series, the author reviews the different types of enclosure described in the previous articles and either estimates the cost of constructing each or gives actual costs of those already built.

In depths of from 5 to 7 m., a scaffolding framework or a piled framework can be used. Although the type of bottom and the kind of mesh fabric used affects the cost, an A-frame net enclosure (including scaffolding, connections, spreader chain, footchain, sinkers, fishing nets, and predator nets) costs about £2 per square foot of net barrier area; the K-frame type of barrier (including diving) costs about 16/9d per square foot. The cost of constructing a piled framework (including the cost of the rent on a piling vessel, the underwater cables, and handling of the piles) should not exceed the cost of the shallow-water net enclosures. These piled structures are the most suitable for hanging nets at water depths of greater than 8 m., where scaffolds are unwieldy. Additional restraint for the piles can be provided by offshore moorings; this type of enclosure (including floats, wire rope, sinkers, anchors, fish netting, and predator netting) costs about £1 per sq. ft. of net barrier area.

In articles 5 and 6, the author discussed the costs of constructing impermeable barriers of concrete, rock-fill, and sand in-fill. However, the costs given did not include the control sections containing the sluices, for they are

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9.16 (1.81) L.I. FIRM NEARLY READY TO MARKET FIRST GREENHOUSE-RAISED OYSTERS

Wacker, Robert, Jr.
National Fisherman 51, No. 6, 4C (October 1970)

In a method developed by a Long Island oyster grower and a marine biologist at the Suffolk Community College, Selden, New York, oysters are kept in a controlled environment from the seed to the marketing stage. The growing area is under a 144-ft.-long fiberglass dome that covers a channel linking a pond fed by several large springs and the waters of Southold Bay. The water throughout the system is about 2 p.p.m. less salt than that in the Bay, a factor that the growers believe accounts for the phenomenal growth of the oysters. Plump, mature oysters are grown from seed in less than 18 months; losses are well under 5%. With traditional methods, losses run from 95 to 98%. The growers believe they can reduce the 5% loss, since most of it has been due to handling mistakes.

Cultchless sets of oysters are placed in baskets that are stacked on frames in about 6 ft. of water. The bottom baskets in each rack are left empty to protect the oysters from suffocating in the mud, and the top baskets are left empty to protect the oysters from starfish and drills. (Future plans call for growing clams in the bottom ones, since they don't object to mud.) Nutritious algae and other plant organisms from the bay and the pond continuously wash over the growing oysters. A commercial fertilizer is added to the pond to stimulate plant growth there. However, both the fiberglass dome and the baskets are tinted green to retard algal growth in the oyster-raising area. At intervals, workmen lift the baskets out of the channel and clean them of excess food and the oysters' excretion. The company is experimenting with a mild chlorine dip to remove sea squirts, which fasten themselves to the oysters' shells and compete for the food.

[3 photographs]

9.16 (0.8) DEEP OCEAN WATER AS A RESOURCE FOR COMBINED MARICULTURE, POWER AND FRESH WATER PRODUCTION

Gerard, R. G., and O. A. Roels (Lamont-Doherty Geological Observatory, Columbia University, Palisades, New York 10964)
Marine Technology Society Journal 4, No. 5, 69-78 (September-October 1970)

The authors propose multipurpose installations that will utilize a new marine resource (deep cold water) for production of electrical power and fresh water, and for mariculture purposes. The concept calls for integrated plants that would be based at the seashore at selected coastal or island locations where the steep offshore slopes provide access to deep ocean water a few miles off coast. Such water at about 5° C. has nutrient concentrations far greater than surface water has; therefore, it is a valuable resource when brought up through large-diameter pipelines to shore installations. It could be used to cool a nuclear reactor so that its discharge can be returned to the sea at ambient temperature (thereby eliminating "heat pollution"), or it could be used for condensing fresh water directly from the atmosphere or for the improvement of conventional desalination processes. Also, the cold water could be used to cool the condenser portion of a Claude-type electrical power generator (Thermal difference between the surface and deep water is about 20° C.). Finally, the discharged sea water (with only its temperature altered and containing nutrients 200 times the amount in surface waters) could be directed into a semienclosed bay or lagoon, where commercial mariculture operations could be carried out.

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9.19 (1.85) LOCALIZATION OF DDT IN THE BODY ORGANS OF PINK AND WHITE SHRIMP

Nimmo, D. R., A. J. Wilson, Jr., and R. R. Blackman (Bureau of Commercial Fisheries Center for Estuarine and Menhaden Research, Pesticide Field Station, Gulf Breeze, Florida)
Bulletin of Environmental Contamination & Toxicology 5, No. 4, 333-341 (July-August 1970)

In 1963, Butler and Springer reported that of all the crustaceans, the penaeid shrimp is one of the most sensitive to organochloride pesticides. However, few data have been reported about pesticide residues in the organs of these shrimp or about the sites were the pesticides may be localized. The present authors conducted five laboratory experiments to determine how much and where DDT would accumulate in shrimp. They used adult pink shrimp (Penaeus duorarum) and adult white shrimp (Penaeus setiferus) caught off the northwest coast of Florida in their investigation.

In the first experiment, 90 shrimp were exposed to 0.14 p.p.b. DDT for 22 days. Every third day, 10 of the shrimp were removed from the tank and analyzed for DDT accumulation. Successive analyses showed total body residues as follows: 0.02, 0.06, 0.19, 0.21, 0.16, 0.15, and 0.15 p.p.m. DDT; the initial amount was less than 0.01 p.p.m.

In the second experiment, 36 shrimp were exposed to 0.05 p.p.b. DDT to determine if this concentration, like 0.1 p.p.b., is lethal. After 56 days, 30% of the shrimp were dead (17% of the untreated controls also died, possibly due in

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9.16

The authors conclude, among other things, that: (1) The development of cost-sharing integrated multipurpose plants based on deep-water resource would have important economic and social benefits. Areas that are now improductive could be supplied with abundant power, fresh water, and high-protein food. (2) The integrated system is especially appealing because of its lack of environmental pollution hazard. [11 figures, 4 tables, 24 references]

FTP

Live carp (Cyprinus carpio Linnaeus) were transferred from a river location receiving effluents from a major municipality (test fish) and from a river site receiving little industrial effluent (control fish) to a spring-fed and to a run-off holding pond. Holding the carp in either pond for as long as 18 days did not improve the aroma or flavor of the test carp. [3 figures, 1 table, 9 references]

9.19 INFLUENCE OF ENVIRONMENT ON PALATABILITY OF CARP (8.8)

Korschgen, Bernie M., Ruth E. Baldwin, (Department of Food Science and Nutrition, University of Missouri), and John W. Robinson (Missouri Department of Conservation, Columbia, Missouri 65201)
Journal of Food Science 35, No. 4, 425-428 (July-August 1970)

9.16

peculiar to each site and their cost is governed by their complexity. Small concrete seawalls (built at Ardtoe in 1965) 10 to 12 ft. high and requiring shuttering cost £9 per cu. yd., or £150 per lin. yd. A rock-fill dam 10 ft. high (built to divert fresh water at Ardtoe) and having a puddle clay core cost £6 per cu. yd. With sand as an in-fill material, a barrier 90 ft. high (built in the Netherlands) cost about £1,000 per lin. yd.; with fly ash as in-fill, a 20-ft. high barrier (built on the Firth of Forth) cost £175 per lin. yd.; and with quarry waste as in-fill, a 30-ft. high dam (built in 1963 on the Rhone) cost £2,000 per lin. yd.

The author ends the article by repeating the necessity of obtaining background meteorological and hydrographical data before the design of a sea-farm enclosure is begun. He emphasizes the need for specific information about tidal heights and currents, seabed sediment, and the location of rock outcroppings, and he recommends that exposure tests be run on various types of mesh fabric to learn what type of fouling organisms are present and the sequence of their settlement.

[2 figures, 1 table, 7 references (88 references in the series)]

The requirement of young carp for biotin (as determined by weight gain and content of biotin in the hepatopancreas) is 0.1 mg. per 100 g. of the diet or 0.02-0.03 mg. per kg. of weight per day. [3 figures, 3 tables, 15 references] FTP

9.14 B VITAMIN REQUIREMENTS OF CARP--
III. REQUIREMENT FOR BIOTIN

Ogino, Chinkichi, Takeshi Watanabe, Jun Kakino, Noriyuki Iwanaga, and Masanori Mizuno (Laboratory of Fisheries Biochemistry, Tokyo University of Fisheries, Konan 4, Minato-ku, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 7, 734-740 (July 1970)

9.19

part to the stress of confinement). DDT residues in the hepatopancreas, the ventral nerve, and the heart were 0.7, 0.4, and 0.17 p.p.m., respectively; in the total body, 0.06 p.p.m. Residues in other tissues were less than 0.1 p.p.m.

In the third and fourth experiments, 14 pink shrimp were exposed to 0.12 p.p.b. DDT and 9 white shrimp were exposed to 0.2 p.p.b. DDT. As soon as they showed signs of acute poisoning, they were removed from the tank and frozen (to prevent autolysis). The last white shrimp was removed after 18 days and the last pink shrimp after 28 days. The amount of DDT (including DDD and DDE) that accumulated in the individual tissues is shown in the accompanying table.

Localization site	DDT residues in shrimp	
	white	pink
	(p.p.m)	
Hepatopancreas	11.00	40.40
Gills	0.36	2.20
Digestive tract	0.04	1.97
Ventral nerve	0.55	1.86
Heart	0.46	1.69
Exoskeleton	0.86	0.66
Tail muscle	0.02	0.19

In the fifth experiment, 42 pink shrimp were exposed to 0.17 p.p.b. DDT for 5 days. They were then moved to uncontaminated aquaria and analyzed, four per week for 6 weeks, for DDT depuration. Successive analyses of residues in the hepatopancreas showed 12.17 (immediately after removal from the contaminated tank), 9.40, 0.95, 0.96, 0.61, and 0.31 p.p.m. DDT. After an initial 0.12 p.p.m., the remaining tissue showed less than 0.01 within 3 weeks.

One of the major indications of this study involves consumer health: DDT is localized in the hepatopancreas, which is discarded when shrimp are processed for human food, and the edible tail muscle contains the least amount of residue--well below that considered hazardous to health. [7 tables, 3 references]

9.17 BOUNTY OF THE SEA LIMITED, WARNS CALIFORNIA SCIENTIST
(9.6)

Frye, John (reviewer)
Population, Resources, Environment, Issues in Human Ecology, 383 pp. Published by W. H. Freeman & Co., San Francisco, n.d. $8.95
Paul R. Ehrlich, and Anne H. Ehrlich
National Fishermen 51, No. 6, 12C (October 1970)

In this new book by a Stanford University biologist and his wife, the prospect of man's finding only a way to starve himself to extinction is projected. Nor do the authors put much faith in the fond hope that fish and other marine resources will provide enough protein to meet world food emergencies. History has shown that man treats the sea's bounty as the man in fable did his layer of golden eggs. This approach is particularly evident in the trends in fishing technology, where more efficient equipment is designed to harvest young and old alike or, at best, to take the previously unexploited stocks that supply food for species we do exploit. Because of pollution, a factor that is largely disregarded in the rosy predictions of the role fish farming will play in solving the world food problem, and extreme overpopulation, the yield from the sea will probably be lower by 1980 than it is now.

The authors offer a broad program involving population control, by government action if necessary; restoration of a quality environment, including a campaign to de-develop the United States; international action aimed at abandonment of the balance of terror and toward helping underdeveloped countries; public support of legislative and government efforts to meet the environmental and population problems; and a goal in which Spaceship Earth is the kind of place it ought to be, with the kind of crew that should man her. LB

9.19 (1.37)(9.13) ORGANOCHLORINE INSECTICIDE INTERACTIONS AFFECTING RESIDUE STORAGE IN RAINBOW TROUT

Mayer, F. L., Jr., J. C. Street, and J. M. Neuhold (Animal Science Department and Ecology Center, Utah State University, Logan, Utah)
Bulletin of Environmental Contamination & Toxicology 5, No. 4, 300-310 (July-August 1970)

Although most organisms are probably exposed to more than one insecticide in their natural environment, the interactions of these insecticides have been studied somewhat scantily. The purpose of this study was to determine the effect of such interaction on the visceral fat of rainbow trout that had been treated with up to three insecticides simultaneously.

Dieldrin (1,2,3,4,10,10-hexachloro-6,7-epoxy-1,4,4a,-5,6,7,8,8a-octahydro-1,4-endo,exo-5,8-dimethanonaphthalene), DDT (2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane), and methoxychlor (2,2-bis(p-methoxyphenyl)-1,1,1-trichloroethane) were used in a 3^3 completely random factorial design, the three dose levels of each insecticide being, respectively, 0, 0.04, and 0.2 mg.; 0, 0.2, and 1.0 mg.; and 0, 0.6, and 3.0 mg. Each insecticide was dissolved in corn oil and administered orally to the fish in gelatin capsules. Six fish were treated with each of the 27 possible compound and dose combinations. They were dosed every other day until they had received seven doses; then they were killed and their fat was analyzed for lipid content and residual insecticides.

All the fish survived the experiment without any significant change in weight; however, some of the fish given the higher dose combinations were beginning to lose

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9.19 SIGNIFICANCE OF THE FOOD CHAIN IN DDT ACCUMULATION BY FISH

Macek, Kenneth J., and Sidney Korn (Bureau of Sport Fisheries and Wildlife, Fish-Pesticide Research Laboratory, Columbia, Missouri)
Journal of the Fisheries Research Board of Canada 27, No. 8, 1496-1498 (August 1970)

The purpose of this study was to evaluate under laboratory conditions the relative importance of food and water as sources of DDT for fish and to relate these results to situations in the natural environment.

The brook trout, Salvelinus fontinalis, was used in these tests. In one set of tanks the trout were continuously exposed to an effective concentration of 3 ± 0.3 p.p.tr. of ^{14}C-labeled p,p'-DDT in water for 120 days. Trout in another set of tanks were fed 3 ± 0.15 p.p.m. ^{14}C-labeled p,p'-DDT incorporated into a dry pellet ration for 120 days. The fish were fed these pellets once daily at a rate of 1.5% of their body weight per day--a rate equivalent to a dosage of 0.045 mg. DDT per kg. per day.

The brook trout accumulated about 10 times more of the available DDT from the food than they did directly from the water. In the aquatic environment the concentration of DDT is usually much higher in the food chain than in the water; therefore, the food chain is probably the major source of DDT for fish in natural waters. [1 figure, 3 references]

9.19 (9.12) (1.9) SENSITIVITY TO PESTICIDES IN THREE GENERATIONS OF SHEEPSHEAD MINNOWS

Holland, Hugh T. (Department of the Army, U.S. Army Engineer District, Jacksonville, Florida), and David L. Coppage (Bureau of Commercial Fisheries Center for Estuarine and Menhaden Research, Pesticide Field Station, Gulf Breeze, Florida)
Bulletin of Environmental Contamination & Toxicology 5, No. 4, 362-367 (July-August 1970)

In 1966, Holland et al. reported that sheepshead minnows (Cyprinodon variegatus) whose parents had survived toxic concentrations of DDT were more sensitive to DDT and endrin (an insecticide related to DDT) than were the offspring of control fish that had not been exposed to DDT. In the present study, the authors attempted to determine whether successive generations of these minnows can develop a resistance to DDT and a cross-resistance to endrin.

Wild sheepshead minnows collected in July 1964, March-April 1965, and July 1965 were distributed five to an aquarium and exposed to concentrations of DDT in acetone ranging from 15 to 40 p.p.b.; 95% or more died within 24 hr. Survivors were transferred to brackish-water breeding ponds to reproduce. Their offspring, when they reached a total length of about 30 mm., were exposed to DDT and offspring of the fish caught in March-April were bred in essentially the same manner as the first-generation parents. So was the third generation of this particular line of fish. Second and third generation fish that had survived exposure to DDT were also exposed to endrin.

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9.19 (8.8) PALATABILITY OF THREE SPECIES OF FISH AND AROMA OF WATER FROM SITES ON THE MISSISSIPPI RIVER

Baldwin, Ruth E., Kay Gonnerman Sides, Marion Cloninger, and Bernice Korschgen (Department of Food Science and Nutrition, University of Missouri), and John W. Robinson (Missouri Department of Conservation, Columbia, Missouri 65201)
Journal of Food Science 35, No. 4, 413-417 (July-August 1970)

During the period 1945 to 1967 the harvest of fish from the Mississippi River declined by about 69%. Although the reasons for this decline are not fully understood, some have mentioned that pollution of the river and its possible effect on the flavor of the fish may be at least partially responsible. Accordingly, this study was carried out to (1) assess the palatability of fish taken from the Mississippi River at varying distances from a major source of pollution and (2) determine whether the assessment of the aroma of the river water might be useful in predicting the palatability of the fish taken from the river. Carp, flathead catfish, and fresh-water drum and the river water were sampled three times from five different river locations, one near, one above, and three below St. Louis, Missouri.

From this study the researchers concluded that at certain times of the year the flavor of carp, flathead catfish, and fresh-water drum may be adversely affected by pollution of their environment from a municipal-industrial complex. The extent of the damage to flavor varied directly with the proximity of the fishing grounds to the source of pollution; however, the degree of such influence varied with the species. The aroma of the fish was also adversely affected by pollution but not to the extent that flavor was affected. The scores for aroma of the river water varied with the location of the source of river water sample but did not correlate with the palatability of the fish from each location.

[3 figures, 3 tables, 8 references]

9.19 BRIDGING THE ENVIRONMENTAL ABYSS. PART 1

Lachman, Robert I. (Environmental Engineer, Food Science Department, Cornell University, Ithaca, New York)
Canner/Packer 139, No. 9, 14-16 (September 1970)

Economical disposal of waste is one of the most serious problems of our food industries. Most food processors are trained in food science, processing, and engineering and environmental consultants (engineers) are trained to solve domestic waste problems. The Engineering Foundation, therefore, called a conference of environmental engineers and food processors to help resolve the information and communication gap between these interests. Designs for practical economic environmental treatment facilities will depend upon meaningful communications between these two groups.

The present article--the first of four--deals with conservation philosophy and attitude toward our environment. Part 2, to be published in the October issue of this journal, will cover wastewater management; Part 3 (November issue) will cover treatment methods; and Part 4 (December issue) will deal with the conclusions and recommendations of the Conference.

Poor management of food solids and water has caused 90% of the wastes in the food industry; housekeeping, therefore, must be improved. Steps must be taken to stop such practices as result in the wasting of water, spilling of brine, and damaging the food. Even though good housekeeping will reduce waste loads, cyclic techniques should be used whenever possible because they return added values to the whole production. The Conference suggested that the environmental problems of the food industries can be resolved only through a cooperative approach to water conservation, product recovery, and process revisions. FTP

9.19 METHYLMERCURY IN FISH (8.42)

Noren, Kolu, and Gunnel Westoo (Statens Inst. Folkhalsan, Stockholm, Sweden)
Chemical Abstracts 73, No. 9, 44022v (August 31, 1970)

9.19 YELLOW PHOSPHORUS POLLUTION: ITS TOXICITY TO SEAWATER-MAINTAINED BROOK TROUT (SALVELINUS FONTINALIS) AND SMELT (OSMERUS MORDAX)

Fletcher, G. L., R. J. Hoyle, and D. A. Horne (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 27, No. 8, 1379-1384 (August 1970)

During the first quarter of 1969 several fish kills took place in Long Harbour and neighboring regions of Placentia Bay, Newfoundland. There appeared to be a casual relation between the fish kills and pollution of the environment with elemental phosphorus. Although the toxicity of yellow phosphorus for mammals is known, little information was available pertaining to fish. This study, therefore, was carried out to examine the toxicity of elemental phosphorus to sea water-maintained trout. The researchers also carried out some preliminary observations on the toxicity of phosphorus to smelt.

Yellow phosphorus was lethal to brook trout and to smelt maintained in sea water at concentrations as low as 0.5 μg. per liter. Those trout that were exposed to low concentrations of yellow phosphorus (0.5 and 7.0 μg. per liter of the seawater) for 50 hours or more turned red and showed signs of extensive hemolysis.
[4 figures, 9 references] FTP

9.19 SIDE EFFECTS AND ENVIRONMENTAL DISTRIBUTION OF INSECTICIDES USED IN TSETSE CONTROL IN AFRICA

Koeman, J. H., J. H. Pennings (Inst. Vet. Pharmacol. Toxicol, Univ. Utrecht, Utrecht, Neth.)
Chemical Abstracts 73, No. 13 65347v (September 28, 1970)

Immediately upon being transferred to the breeding ponds, the first generation fish reproduced; second and third generation fish took succeedingly longer periods of time. Second generation fish were exposed to 15 p.p.b. DDT or to 1 p.p.b. endrin and their sensitivity was compared with that of unexposed controls The fish born in March or April and tested in May or June were less sensitive to both pesticides than the controls were; those born in July and tested in August or September were more sensitive. The third generation fish that survived exposure to 15 or 20 p.p.b. DDT in August or September reproduced in February and March of the following year. The sensitivity of this fourth generation, which was tested in March, April, and May, was less pronounced than was the controls'.

These results indicate that sensitivity to pesticides is more a function of season of the year than of inherited resistance--the experimental fish were always more sensitive than the controls. The authors suggest that since lipid metabolism and maturation of ova are greatest during those seasons when the parents were exposed, incorporation of DDT into the ova by way of the lipids may have influenced the increased sensitivity. Burdick et al. (1964) suggested this causal relation for DDT in lake trout. [1 figure, 2 tables, 3 references]

9.15 COMMON CATFISH DISEASES AND PARASITES (9.16)

Thompson, Kenneth W., and William M. Lewis (Fisheries Research Laboratory and Department of Zoology, Southern Illinois University, Carbondale, Illinois)
American Fish Farmer & World Aquaculture News 1, No. 12, 18-20 (November 1970)

In this article, the authors consider some of the common parasites of cultured catfish. The Trichodina, Ichthyopthirius, Myxosporidians, Scyphidia, Columnaris, and Dactylogyrus, are discussed and illustrated. FTP

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their vigor toward the end of the study. When DDT and dieldrin were fed in combinations, the accumulation of both DDT and DDE (1,1-dichloro-2,2-bis(p-chlorophenyl) ethene), a DDT metabolite, in the tissue increased. Previous workers had noted this effect in rats; however, the response in trout was of much greater magnitude. When either DDT or methoxychlor was administered with dieldrin, dieldrin storage was reduced; of the two, methoxychlor had the more pronounced reduction effect. The reduction effect of DDT on tissue dieldrin was much more in rats than in the trout. When DDT and methoxychlor were fed in combination, methoxychlor storage was reduced. However, when dieldrin and methoxychlor were fed together, methoxychlor storage was increased; at doses of 3.0 mg. methoxychlor, the increase was highly significant ($P < .01$).

From these results, the authors conclude that insecticide interactions do occur and that residual storage of the insecticides involves enzyme induction. They note that the capacity for organochlorine pesticide metabolism is appreciably different in rats and trout. [4 tables, 22 references]

9.19 SYMPOSIUM ON FERTILIZER USE AND WATER QUALITY

Kilmer, Victor J. (Tennessee Valley Authority), et al.
Journal of Agricultural and Food Chemistry 18, No. 5, 773 (September-October 1970)

Introduction, by Victor J. Kilmer, p. 773.

The Symposium was organized for the purpose of presenting objective data and viewpoints on the use of fertilizers and their effect on water quality. Four of the papers presented at the Symposium are published in this issue of the referenced journal.

The Fate of Applied Nutrients in Soils, by L. T. Kurtz (Agronomy Department, University of Illinois, Urbana, Illinois 61801) pp. 773-780.

Most fertilizers are inorganic salts containing cations of potassium, ammonium, and calcium with anions of phosphate, nitrate, chloride, and sulfate. Nitrogen is usually applied as anhydrous ammonia or as urea. Fertilizers do not modify to an appreciable extent the kinds of cations in drainage water. The cations from fertilizers undergo exchange reactions so that the calcium cation is dominant in the leacheates from well-limed agricultural soils.

Phosphates react with the soil and remain near the point of application. Nitrogen is normally transformed to nitrate which is not strongly held in the soil. The nitrate anion is the major concern in the contamination of ground waters by fertilizers. Chloride and sulfide apparently are not expected in harmful amounts. The anions that appear in drainage waters are accompanied by equivalent amounts of calcium and magnesium. All fertilizers may leach from sandy soils.

[12 tables, 45 references]

Accumulation of Phosphates in Water, by Robert F. Holt, Donald R. Timmons, and Joseph J. Latterell, pp 781-784.

9.19 CHUM LINE CONSIDERED AS POLLUTANT

Jabine, William
National Fisherman 51, No. 7, 26C (November 1970)

In mid-November 1969, two licensed commercial fishermen were brought to court for polluting the waters while chumming for mackerel in King Harbor, California, a popular commercial fishing ground. They were convicted. They then appealed, on the grounds that (1) the section of the municipal ordinance they were charged with violating does not prohibit their fishing [King Harbor is entirely within the city limits of Redondo Beach.], and (2) if it did, it would be invalid because it would invade an area of regulation preempted by state law. The conviction was upheld on the grounds that (1) the municipal ordinance expressly states that bait must be attached to a hook, and (2) the court's research disclosed no authority indicating that the state had preempted the field of prevention of local water pollution. Thus their manner of fishing was proscribed, and the municipal ordinance under which they were charged is valid.

9.19 SPAWNING BED SEDIMENTATION STUDIES IN NORTHERN CALIFORNIA STREAMS

Burns, James W. (Inland Fisheries Branch, California Department of Fish and Game)
California Fish and Game 56, No. 4, 253-270 (October 1970)

This article describes changes in the composition of spawning beds for silver salmon and trout that accompanied logging and associated road building. The composition of the spawning beds for salmon and trout in four test streams changed after logging, roughly in proportion to streambank disturbance. Sustained logging operations and road construction kept the levels of sediment high in one stream for several years. The control streams showed little change in composition of the spawning bed over a 3-year period. [4 figures, 8 tables, 34 references]

9.2 STRATEGIES FOR FISHERIES DEVELOPMENT
(1.012)

Kesteven, G. L. (FAO Fisheries Development Program, Mexico)
Australian Fisheries 29, No. 7, 25-30 (July 1970)

This first section of the article deals with the general principles of fisheries development.

The simplest form of fisheries development is exploitation of a resource that has not been fished at all. Although all fisheries begin this way, some develop more rapidly than others. Some achieve the maximum sustainable yield at once, whereas others are halted in middevelopment. Even when the catch is maximum it may be developed further by technical and managerial changes that increase efficiency and raise productivity and profitability. Thus the amount of catch is not the only criterion of development--development must be considered in terms of a wide range of possible changes.

The first step in planning and directing a fisheries development program is establishment of a series of scales of change. These scales will cover one or a number of aspects of the fishery: the catch, which must include such factors as the degree and the absolute level from or to which the change occurred, the number of fishermen and boats, and the capacity of processing and storage facilities; the rate of production--for example, changes in catch per man and catch per boat--expressed in terms of money or of quantity; the use of resources available to the fishery; the efficiency, productivity, and profitability of operations in every sector of the fishery; the role of the fishery in the nation's nutritional posture; or the fishery's contribution to the national economy, expressed in terms of employment, gross national product, or balance of payments.

9.19 THE CONVERGENCE OF ENVIRONMENTAL DISRUPTION

Goldman, Marshall I. (Wellesley College, Wellesley, Massachusetts)
Science 170, No. 3953, 37-42 (October 2, 1970)

The author's analysis of environmental pollution in the Soviet Union suggests that abolishing private property will not necessarily mean an end to environmental disruption. Industrialization, not private enterprise, is the primary cause of environmental pollution. The U.S.S.R. has environmental disruption that is as extensive and as severe as that in the United States. There seems to be little reason to believe that a strong centralized and planned economy has any notable advantages over other economic systems in solving environmental problems.

[12 references]

9.19 MARINE ENVIRONMENT POLLUTION SUBJECT OF SYMPOSIUM

Anonymous
Australian Fisheries 29, No. 9, 16 (September 1970)

A one-day symposium on pollution in the marine environment was organized by the Australian Marine Science Association and convened in August by the officer-in-charge, Marine Pollution Studies, Victorian Fisheries and Wildlife Department. Among the presentations to those attending were:

A review of pollution problems in the oil industry, by E. K. Erickson (Australian Gulf Oil);

Disposal and dispersing of oil spills, by W. W. Mansfield (Division of Applied Chemistry, CSIRO);

The Esso contingency plan, by K. Denton (Esso Standard Oil);

Control of off-shore wells, by H. Taylor-Rogers (Geology and Geophysics Section, Bureau of Mineral Resources);

Trade waste disposal in the marine environment, by T. D. Lacey (Department of Chemical Engineering, Monash University); and

Water quality criteria, by J. S. F. Rogerson (State Rivers and Water Supply Commission, Victoria). LB

9.19 TOXIC EFFECTS OF TRACE ORGANICS ON FISH (7.43)(0.34)

Smith, John Warren, Sotirios G. Grigoropoulos (Esso Res. and Eng. Co., Florham Park, New Jersey)
Chemical Abstracts 73, No. 18 91024g (November 2, 1970)

9.2

These scales provide a means of formally classifying instances of development so that opportunities for further development can be identified. Basic to the developmental program, however, is the availability of information about each fishery (so its state of development can be classified) and of standards by which states of development can be compared and judged. But information alone is not enough. An equally important consideration is intention, which implies confidence in development prospects and incentives to undertake those activities that will bring about development changes.

Development, then, consists of physical and organizational changes (in boats, gear, processing plants, products), which are brought about by operatives (fishermen, engineers, managers) who expect to derive benefits from them. If development is to occur, these people must be assured of the benefits. Therefore, the basic elements of a development strategy are the collection, analysis, and interpretation of data relating to the industry and the effective dissemination of the information to all those in government and industry.

Example: Mexico Fisheries, by G. L. Kesteven and Robert Ingpen.

This second section of the article is a concrete example of how the principles enunciated in the first section can be applied. It begins with a definition of Mexico's fishery problem, a listing of the means whereby Mexican fisheries can be developed, and a statement of the objectives of a development program. Then it discusses the application of methods that enhance the knowledge of the resource and the industry. It ends with a concrete example--the five principal courses of action involved in a strategy for improving the Mexican shrimp industry. [5 figures]

9.19

Sources of phosphorus that accumulate in surface waters include precipitation (rainfall), animal wastes, fertilizers, and land runoff. Actually, the contribution from these sources is extremely low; however, the concentration of phosphorus required to support algal blooms is so low that the amounts supplied by these natural and agricultural sources is sufficient to exceed this requirement. Eroded soils deliver significant amounts of phosphorus to surface waters, but the soil materials sorb the phosphorus and limit the tendency to release it into the water. Bottom sediment appears to be a sink for dissolved orthophosphate that is delivered to surface waters. Leaching of vegetation can supply large amounts of phosphorus to surface waters. Deep incorporation of phosphate fertilizers into the soil reduces the amount of phosphorus in runoff waters as compared to shallow incorporation of the fertilizers into the soil. [1 table, 37 references]

Methods of Removing Nitrates From Water, by Percy P. St. Amant (Robert S. Kerr Water Research Center, P.O. Box 1198, Ada, Oklahoma 74820), and Louis A. Beck pp. 785-788.

Methods of removing nitrate from water being studied involve algae growth and harvesting, bacterial denitrification, and filter denitrification. Also, desalination of waste waters by reverse osmosis and by electrodialysis is being investigated. [1 table, 7 references]

Soil Use and Water Quality--A Look Into the Future, by Frank G. Viets, Jr. (Research Division, USDA, P.O. Box E, Fort Collins, Colorado) pp. 789-792.

The use of fertilizers is being blamed for substantial eutrophication of surface water but actually the importance of nitrogen and phosphorus in eutrophication is not known. Phohibition or regulation of use of fertilizer is not justified on the basis of existing information, but the author states that regulation on a local option basis along with other nutrient control measures may be necessary when the facts become sufficient. [1 table, 21 references]

9.19 DDT RESIDUES IN MARINE PHYTOPLANKTON: INCREASE FROM 1955 to 1969

Cox, James L. (Hopkins Marine Station, Pacific Grove, California 93950)
Science 170, No. 3953, 71-73 (October 2, 1970)

Phytoplankton represent the first link in pelagic food chains. The amount of DDT residues in phytoplankton, then, is relevant to all high-order consumers on the food chain. Phytoplankton samples were collected periodically in Monterey Bay, California, from 1955 to 1969. They contained p,p′-DDT, p,p′-DDD, and p,p′-DDE. The samples in the later years of the collection period contained about three times the concentrations of these compounds as the samples collected in the earlier years. The lower concentrations of the compounds in the phytoplankton throughout the test period were associated with higher densities of standing crop.

The data suggest that the residues of DDT may be increasing in the primary stages of coastal pelagic food chains. If the processes of decomposition and dispersal of these residues in succeeding steps are not sufficiently rapid to counteract the apparent increase, there may be a delay period before the decline of domestic use of DDT is reflected in the components of these food chains.

[2 figures, 19 references] FTP

9.19 EFFECTS OF INSECTICIDE-TREATED RICE PLANTS AND PADDY WATER ON VERTEBRATE ANIMALS

Lalli, J. H., S. Mohiyuddin, H. P. Prabhuswamy, J. C. Samuel, S. V. R. Shetty (Univ. Agr. Sci., Bangalore, India)
Chemical Abstracts 73, No. 13 65396k (September 28, 1970)

9.3 NOTICIAS NACIONALES [NATIONAL NEWS]
(1.013)

Anonymous
Boletin Informativo No. 6, 9-15 (June 1970) (In Spanish)

On March 25, the Government of Brazil promulgated Decree-Law No. 1098, which extends Brazil's territorial sea to the 200-mile limit. Section 3.2.3 of this Bulletin gives the text of that law.

On December 23, 1969, the Government of Uruguay promulgated Law No. 13,833 declaring the exploitation, preservation, and study of marine resources a matter of national interest. This law extends Uruguay's territorial sea to the 200-mile limit and, among other things, regulates fishing by foreign vessels within these limits, gives notice of the sanctions to be imposed against violators, establishes various means of improving and simplifying administration of the national fisheries, and creates incentives for the development of the private fishing industry. Section 3.3.1 of this Bulletin gives 18 of the law's 44 articles.

9.4 THE "WHEEL OF FORTUNE" SPINS

Ward, Alvah H., Jr.
Fishing Gazette 87, No. 10, 22, 31, 41 (October 1970)

Speaking before the Atlantic Fisheries Technological Conference at the University of Massachusetts, the author, a seafood industries consultant, explained how to develop marine resources wisely and efficiently. He noted the many examples of technological achievement that had been brought out during the conference, the reports on methodology and quality, on the causes and effects of pollution, on microbiology and preservation--all matters that spell the eventual success or failure of the seafood industry. But in these realms of achievement, interagency coordination and unity of purpose remains relatively untouched. The author emphasized that what he is to say is not an attack on the functions, services, or integrity of the institutions represented at the conference. Rather, he wants to point out several factors that may be of interest in the industrial development of the industry, and he is attempting to share with the conferees a modified version of an age-old plan that is beginning to turn the tide of pessimism along the waterfronts of North Carolina. With modification, the plan can be used anywhere in the United States or Canada.

The "wheel of fortune" concept involves the organization, the cooperation, and the dissemination of information among all agencies, institutions, associations, and individuals concerned with marine resources. The first step in developing such a wheel is to inventory people vitally concerned with marine resource conservation and development: those in various state and federal government

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9.6 90TH ANNIVERSARY ISSUE [OF THE FISHING GAZETTE]

Anonymous
Fishing Gazette 87, No. 8, 116 pp. (August 1970)

This anniversary issue is a miscellanea of history, personalities, and nostalgia. It reviews the U.S. commercial fishing industry (ports and vessels, agencies and firms, instruments and methods, harvesting, processing, and merchandising) over the past 90 years, looking by region at the successful evolution of some fisheries (the shrimp fishery, for example) and the decline and virtual abandonment of others (the Texas turtle fishery, for example). It reprints ads, price lists, and columns of jokes and news (not always limited to the fisheries) that appeared in early issues. It is profusely illustrated with old photographs. The history of the Bureau of Commercial Fisheries is recounted (pp. 55-60), and the founding dates of firms associated with the fishing industry are listed. The only signed article in the journal is "BCF and the Future," by Philip M. Roedel, Director of the Bureau (p. 52). Unhappily, no samples are given of the Gazette's serialized versions of novels (including those of Jules Verne and those with such soap-opera titles as "Her Guarded Honor," "Tangled Lives," and "Suspected").

9.7 IT PAYS TO BE INFORMED

Howard, John (reviewer)
New Scientist 47, No. 719, 595-596 (September 17, 1970)

Lord Rayleigh's remark, "Information is expensive--but lack of it is more so," was never more true than it is today. Recognizing this, the Construction Industry Research and Information Association (CIRIA) joined with the ASLIB Engineering Group to organize a conference on information last November. The report of the conference is now available in a 72-page book (available from CIRIA for 39s) titled It Pays to be Informed. The book contains details on information collection and retrieval--the proper function of an information unit, the type of staff needed to run it, and the differences in approach to an information problem taken by the conventional librarian and by the information officer. Although it gives no concrete examples of actual savings, both in executive time and in money, that can be made by the use of a properly oriented information system, it also covers the general costs and benefits of an information service. Because of the scarcity of such cost figures, the reviewer wonders how many agencies treat their information departments as cost centers that should be able to pay their way rather than as mere necessary overheads.

CIRIA has also issued a 40-page booklet (available from the CIRIA Information Liaison Group for 31s), Abstracts Survey and Recommendations, comparing various abstracting systems that are used by several industries. The information it contains should be of use to any abstracter interested in improving his own system.

9.4

departments, trade associations, and academic institutions with workable research programs, as well as community conservation and development consultants, suppliers to the industry, fishermen, wholesalers, distributors, processors, brokers, and consumers. The second step is to determine the name and location of the person in charge of each applicable agency and to develop close working arrangements with him so that coordination of effort will be facilitated.

In the example given, the wheel was formed with the Department of Conservation and Development, Division of Commerce and Industry, as the hub. The spokes were 15 elements of the industry: the N.C. Division of Fisheries, the N.C. Fisheries Association, the Department of Food Science at North Carolina State University, Region II of the National Marine Fisheries Service, the Army's Water and Air Resources agencies, the Coastal Plains Regional Commission, North Carolina's consolidated university system, the N.C. Marine Science Council, the U.S. Department of Agriculture, independent and private research organizations, various related national trade associations, state trade and marketing associations, other state agencies and organizations, other federal agencies, and industry suppliers. When the wheel was laid out, it was noticeable that at least one of the spokes would come into daily contact with some element of the seafood industry and that almost daily each segment of the wheel performed services or received information of importance to other segments. The organizers of the plan then agreed that such information, correspondence, or special effort would be made known to those who needed it most; thereby, duplication of effort could be avoided and available services would be used to the maximum.

9.7 PROJECT MANAGEMENT BY THE CRITICAL PATH METHOD

Walsh, R. M., R. H. Ayers, R. L. Hayne, and R. G. Staples (Research and Development Division, Smith, Kline, and French Laboratories, Philadelphia, Pennsylvania)
Research Management 13, No. 4, 291-300 (July 1970)

Two extremely difficult tasks of the research manager are keeping a complex multiproject research and development program on schedule and resolving the resource conflicts that always arise. In this article, the authors describe how to use a Critical Path Method data base to model both the individual projects and the entire multiproject environment. [5 figures, 3 references] FTP

9.6 NUCLEIC ACIDS ABSTRACTS

Anonymous
Nature 228, No. 5275, 1-11 (December 5, 1970)

Nucleic Acids Abstracts is a new monthly journal that will abstract articles from over 2,750 multidisciplinary primary journals. Its more than 6,000 abstracts a year will be categorized under the following major heads: purines, pyrimidines & analogues; nucleosides & analogues; nucleotides, nucleoside di- & triphosphates & analogues; oligonucleotides, synthetic polynucleotides & analogues; transfer RNA; protein biosynthesis; RNA; DNA; immunology; nucleoproteins; enzymes; book notices; and notification of proceedings.

The journal is available from Information Retrieval Limited, 38 Chancery Lane, London WC2A 1 EL, England, for $150.00 a year. A free specimen journal may be requested. LB

9.3 THE COASTAL ZONE -- CONTROL OVER ENCROACHMENTS INTO THE TIDEWATERS

Teclaff, Ludwik A. (Fordham University School of Law,
Journal of Maritime Law and Commerce 1, No. 2, 241-290 (January 1970)

Material for this article was drawn in part from the author's study for the Marine Environmental Legal Research Project. The project, under the supervision of Albert H. Garreston (New York University Law School), was carried out for the U.S. Department of the Interior on behalf of the National Council on Marine Resources and Engineering Development. The article discusses the conflicts involved in the tidal-zone land uses and structures versus environmental uses under the following headings: Extent of Federal Jurisdiction, Basis and Limits of State Powers, The Role of Local and Regional Entities, and Proposals and Solutions.
[177 footnotes] FTP

9.3 LEGAL IMPLICATIONS OF THE STRATTON COMMISSION REPORT

Wilkes, Daniel (University of Rhode Island, Kingston, Rhode Island)
Journal of Maritime Law and Commerce 1, No. 2, 291-311 (January 1970)

The author indicates that three proposals of the Commission on Marine Science, Engineering and Resources ("Our Nation and the Sea--A Plan for National Action") would: (1) deal with the exploitation of the Continental Shelf and of the bottom of the deep sea in four legal regimes, (2) extend the existing types of fisheries management beyond the 12-mile limit through national catch limits under a quota system for each stock managed, and (3) increase the ability to exploit coastal zones by improving federal surveying, data collecting, and research capabilities. This article discusses some of the legal implications of the three proposals.
[30 footnotes] FTP

9.6 THE SALT WATER AQUARIUM MANUAL
(0.119)

Valenti, Robert J.
The Salt Water Aquarium Manual, 162 pp., profusely illustrated, Aquarium Stock Company: New York [1968] $6.95.
Reviewed by J. C. Fraser
California Fish and Game 55, No. 3, 256 (July 1969)

Although this book was designed primarily as a basic reference and guide for beginning salt-water aquarists, researchers who occasionally need to hold salt-water fish for experimental purposes will find it useful. In contrast with the superclean aquaria usually recommended, the author emphasizes a natural environment, including the presence of algae and bacteria. Not only does he explore the basic considerations involved in the selection and establishment of a marine aquarium, he explains why he makes given suggestions and how the aquarist can avoid common adversities. His sections on water chemistry, light, temperature, and filtration are good and easily understood. LB

0.5 STUDIES ON THE CTC-RESISTANCE OF BACILLUS CEREUS VAR. MYCOIDES--
I. CTC-RESISTANCE INDUCED BY REPEATING CULTURE

Kakimoto, Daiichi, and Tomio Hidaka (Faculty of Fisheries, Kagoshima University, Kagoshima, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 7, 720-724 (July 1970)

Admas, Lerke, and Farber (1966) found that when fillets of English sole were dipped in solutions containing 5 p.p.m. of CTC (chlorotetracycline) then stored, the number of antibiotic resistant organisms on the fillets increased during storage. The fact that certain bacteria can develop a resistance to antiobiotics is important in the preservation of foods; therefore the authors examined the CTC-resistance of B. cereus var. mycoides. This organism is normally highly sensitive to CTC; it is usually inhibited by as much as 0.008 p.p.m. of CTC in Penassay broth using a light inoculum.

The researchers were able to produce a CTC-resistant culture of the organism by repeatedly culturing it in media containing increasing concentrations of CTC. A heavy inoculum was required for each culturing. Furthermore, the authors recommended using the cells from the stationary phase for the inoculum. They theorized that the CTC-resistant culture might be the result of the production by the organism of growth-promoting agents. [5 figures, 4 references]

6.39 AMMONIA PRODUCTION IN UREA-GROWN CULTURES OF CHLORELLA ELLIPSOIDEA

Little, Linda W., and Robert A. Mah (Department of Environmental Sciences and Engineering, University of North Carolina, Chapel Hill 27514)
Journal of Phycology 6, No. 3, 277-280 (September 1970)

Chlorella has been proposed as the oxygen producer in closed environmental systems, such as spacecraft. Although it uses urea (one of the major constituents of human waste) as a carbon and as a sole source of nitrogen, it has been considered urease free, since several previous investigators have been unable to detect ammonia production from urea. In 1967, the authors reported that C. ellipsoidea grown in a urea-glucose medium would produce ammonia. In the present study, they investigated the production of ammonia by urea-grown C. ellipsoidea.

Production of ammonia by urea-grown Chlorella was related to growth phase, pH, and carbon source. Ammonia was produced during the stationary growth phase when urea was the sole source of nitrogen and glucose the source of carbon; excess urea and limiting amounts of glucose had to be present in the medium. No ammonia was detectable when the alga was grown in a urea medium, a urea-acetate medium, or a nitrate-glucose medium. When ammonia was produced, pH increased.

The enzyme, or enzyme system, that C. ellipsoidea produces to form ammonia from urea is discussed. [3 figures, 21 references]

6.36 (9.19) STIMULATORY PROPERTIES OF FILTRATE FROM THE GREEN ALGA HORMOTILA BLENNISTA. I. DESCRIPTION

Monahan, Thomas J., (Department of Biology, Providence College, Providence, Rhode Island 02918), and Francis R. Trainor (Biological Sciences, University of Connecticut, Storrs 06268)
Journal of Phycology 6, No. 3, 263-269 (September 1970)

Autostimulation of growth by filtrates of Hormotila blennista is described. Such stimulation is attributed primarily to the alga's secretion of organic metabolites. Filtrates from actively growing cultures ranging in age from 1 to 4 weeks showed growth-rate stimulation values of more than 100%. The stimulatory properties were heat labile, were not closely controlled by the starting pH within the limits normally encountered in filtrates, and were not the result of depletion of essential nutrients. Along with stimulation of growth rate, the filtrates extended the lag phase of culture growth. They could also support bacterial growth and selectively stimulate or inhibit other algae. The extracellular organic products secreted by H. blennista during active growth, while serving as a survival agent for the organism itself, could also play a regulatory role among other microorganisms in the environment. [3 figures, 4 tables, 37 references]

9.6 'BOATING' ABSTRACTS' SAVES READING; SOME 600 ARTICLES IN ONE PACKAGE

Henderson, Richard (reviewer)
National Fisherman 51, No. 6, 13C (October 1970)

The average boating-magazine reader obviously does not have the time, energy, extra money, or inclination to obtain and study even half the boating periodicals issued every month. Yet unless he does, he almost certainly will miss at least some articles that would be of use to him. Boating Abstracts is a solution to his problem. It is a quarterly journal published by Leisure Abstracts Inc., 5852 Stow Canyon Road, Goleta, California 93017. The subscription price for United States and Canadian subscribers is $20 a year.

Each issue of the journal contains about 600 noncritical abstracts ranging in length from a single sentence to 150 words or more. The source articles are taken from about three dozen magazines published in England, Australia, Canada, South Africa, New Zealand, and the United States. All issues have subject and author indexes but no illustrations. The abstracts are grouped under the following general subject headings: boat buying, boat shows, boating industry, book reviews and films, construction, cruising, designs, engine-propulsion systems, equipment, heavy weather and fog, history and tradition, humor and fiction, law, maintenance, naval architecture and engineering, navigation, ports of call, powerboat racing, safety, sailboat racing, seamanship, singlehanded sailing, and yacht club and boating organizations.

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